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CONTAMINATION ASSESSMENT REPORT FOR UST 2, AVGAS PIPELINE GWPD SITE ID 15495 MCRD PARRIS ISLAND SC

5/1/1997

BROWN & ROOT ENVIRONMENTAL

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Rev. 1
04/28/97

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CONTAMINANT ASSESSMENT REPORT
for
UST 000002 AVGAS PIPELINE

GWPD SITE ID# 15495

Marine Corps Recruit Depot
Parris Island, South Carolina

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0018

May 1997

Rev. 1
04/28/97

CONTAMINANT ASSESSMENT REPORT

for

UST 000002 AVGAS PIPELINE

GWPD SITE ID# 15495

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CONTAMINANT ASSESSMENT REPORT
FOR
UST 000002 AVGAS PIPELINE
GWPD SITE ID# 15495

MARINE CORPS RECRUIT DEPOT
PARRIS ISLAND, SOUTH CAROLINA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
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CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0018

MAY 1997

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CERTIFICATION PAGE

I certify that the information contained in this report and on any attachments, is true, accurate, and complete to the best of my knowledge, information, and belief.

Approved By: Gregory D. Swanson 5/8/97

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SOUTH CAROLINA
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SOUTH CAROLINA
BROWN & ROOT TECHNICAL SERVICES INC.
NO. C00400
CERTIFICATE OF AUTHORIZATION

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FIGURES

ACRONYMS, INITIALISMS, AND ABBREVIATIONS

AVGAS	Aviation Gasoline
AS/SVE	Air Sparging / Soil Vapor Extraction
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene Isomers
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy
CFR	Code of Federal Register
DOT	United States Department of Transportation
DPT	Direct-Push Technology
EPA	United States Environmental Protection Agency
FID	Flame Ionization Detector
FOL	Field Operations Leader
GAC	Granular Activated Carbon
GRO	Gasoline-Range Organics
HSWA	Hazardous and Solid Waste Amendment of 1984
IDW	Investigation Derived Waste
IWPT	Industrial Waste Treatment Plant
MCL	Maximum Contaminant Level
MCRD	Marine Corps Recruit Depot (Parris Island, South Carolina)
MCX	Marine Corps Exchange
MSL	Mean Sea Level
MTBE	Methyl Tertiary Butyl Ether
NAD	North American Datum
NEESA	Naval Energy and Environment Support Activity
NREAO	Natural Resources and Environmental Affairs Officer
OVA	Organic Vapor Analyzer
PAHs	Polycyclic Aromatic Hydrocarbons
POC	Point of Contact
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control

ACRONYMS, INITIALISMS, AND ABBREVIATIONS (continued)

RBSLs	Risk Based Screening Levels
RAP	Remedial Action Plan
RPM	Remediation Project Manager
SCDHEC	South Carolina Department of Health and Environmental Control
SOP	Standard Operating Procedure
SOUTHDIV	Southern Division Naval Facilities Engineering Command
TOM	Task Order Manager
TPH	Total Petroleum Hydrocarbons
USCS	Unified Soil Classification System
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

Brown & Root Environmental (B&R Environmental) has prepared this Contaminant Assessment Report (CAR) for the UST 000002 Aviation Gasoline (AVGAS) Pipeline at the Marine Corps Recruit Depot (MCRD), Parris Island, South Carolina. This CAR was prepared for the U.S. Navy (Navy) Southern Division (SOUTHDIV), Naval Facilities Engineering Command (NAVFAC) under Contract Task Order (CTO) 0018, for the Comprehensive Long-term Environmental Action Navy (CLEAN III) Contract Number N62467-94-D-0888.

The South Carolina Department of Health and Environmental Control (SCDHEC) has designated this site GWPD Site ID#15495. This CAR provides the results of the assessment activities associated with collecting data to evaluate the extent of petroleum hydrocarbon constituents in the subsurface at the former AVGAS pipeline. Data collected during the investigation was used to prepare the CAR in accordance with current SCDHEC regulations.

1.1 GENERAL SITE DESCRIPTION

The MCRD, Parris Island is located approximately 5 miles south of the town of Beaufort, in Beaufort County, South Carolina. The MCRD is located on an island north of Port Royal Sound between the Broad River and the Beaufort River. Figure 1-1 presents the location of Page Field within the MCRD, Parris Island. The former AVGAS pipeline was located within the Page Field area, an inactive air field located at the southern end of the installation.

Page Field has been inactive since at least 1950. The pipeline was previously used to transport AVGAS from four pre-stressed concrete underground storage tanks (USTs) at facility AS-18 southward to four steel USTs at facility AS-16. The pipeline then ran from facility AS-16 south to the Truck Fuel Dispensing Station, located at the corner of Bell Street and Yorktown Boulevard. The pipeline then continued east along Yorktown Boulevard, south along Henderson Street, and then east and north to fueling hydrants located in the old hanger area of Page Field. Figure 1-2 shows the general location of the former AVGAS pipeline route from the AS-16 facility to the Henderson Street Area. Figure 1-3 presents the Truck Fuel Dispensing Station and Figure 1-4 presents the AVGAS pipeline route in the Henderson Street Area.

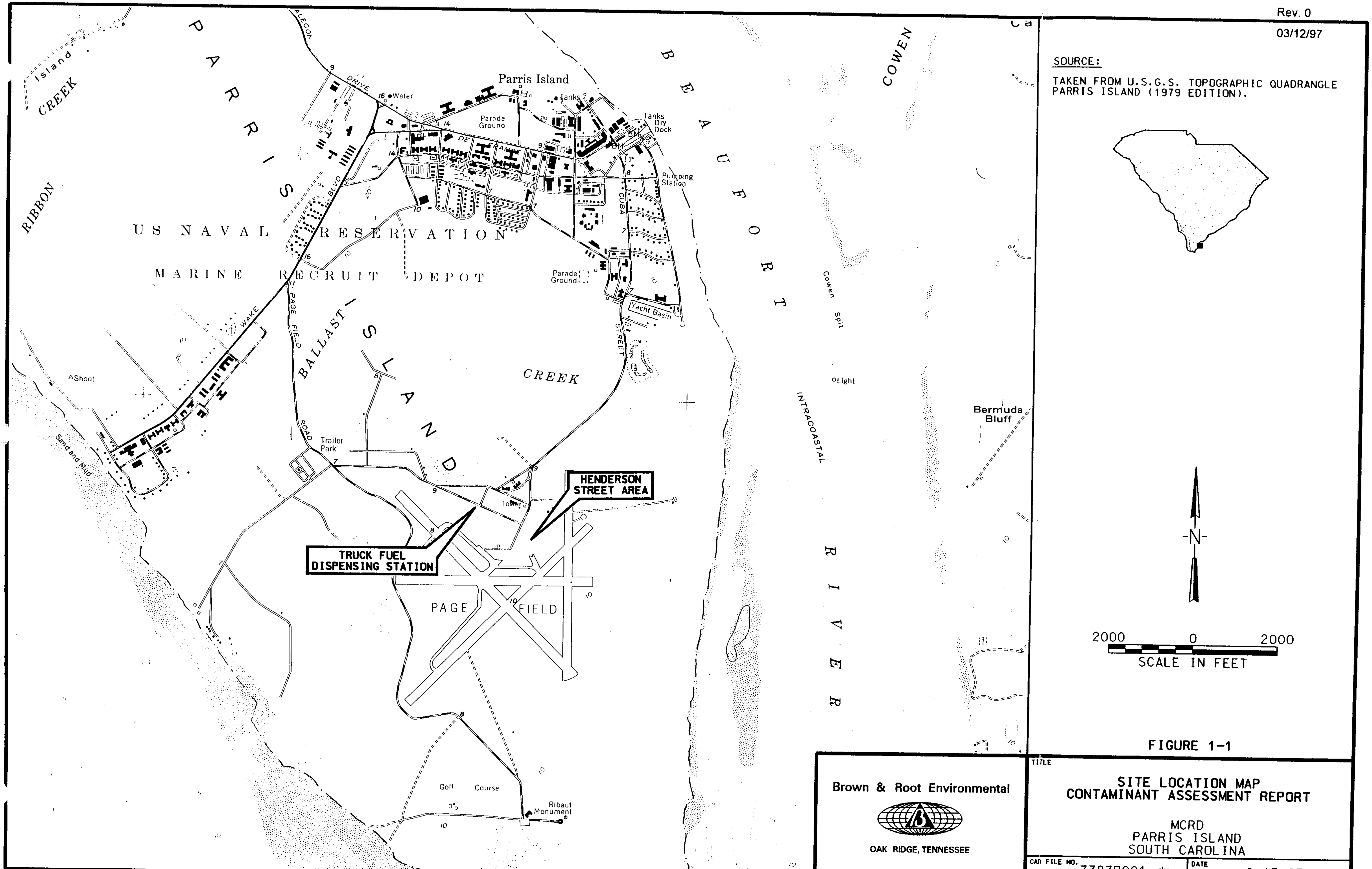

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FIGURE 1-1

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

SITE LOCATION MAP
CONTAMINANT ASSESSMENT REPORT

MCRD
PARRIS ISLAND
SOUTH CAROLINA

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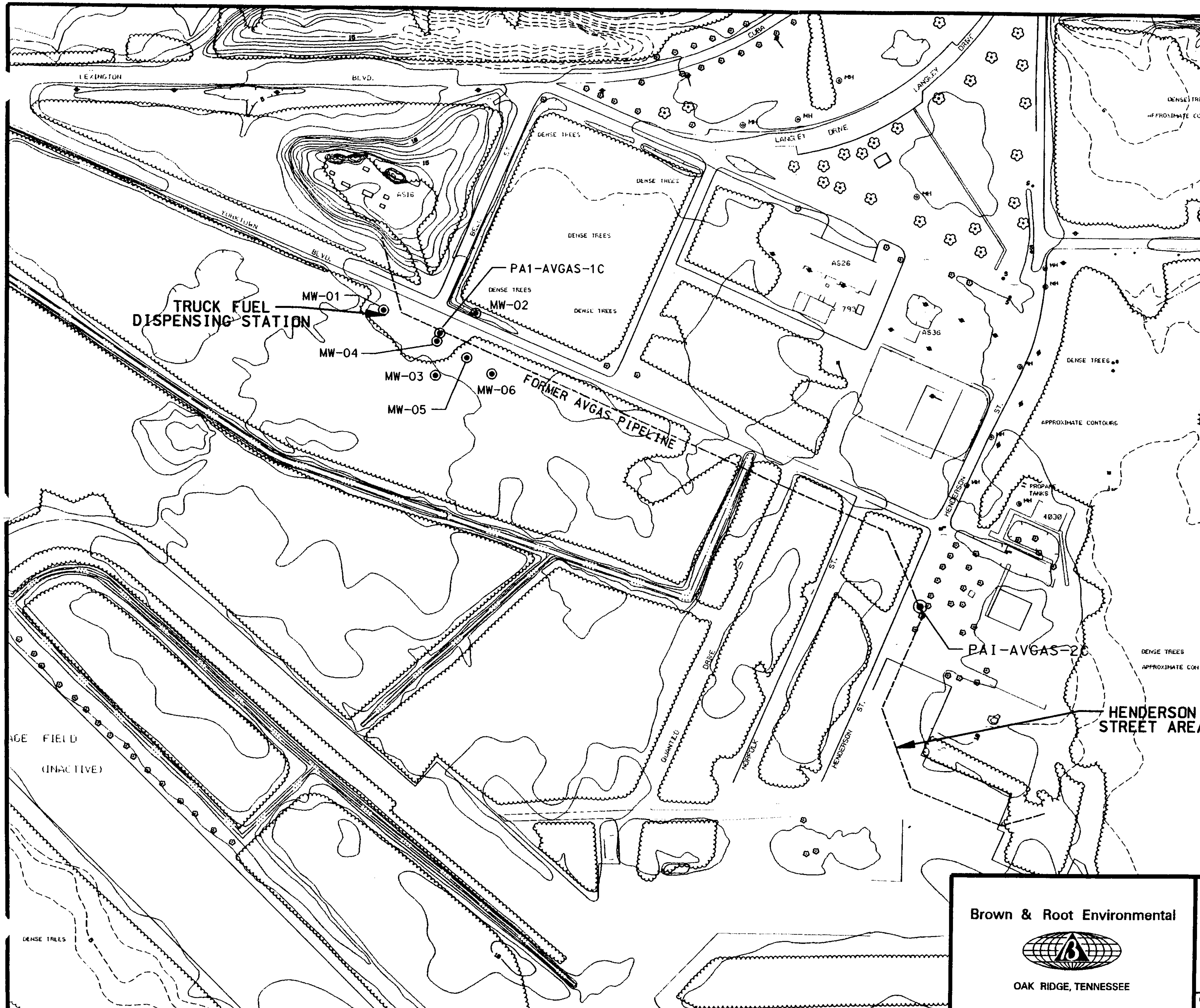

LEGEND

MONITORING WELL

GROUND SURFACE CONTOUR (DASHED WHERE APPROX.)

TREES

-N-

200 0 200

SCALE IN FEET

FIGURE 1-2

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

AVGAS PIPELINE
SITE MAP
CONTAMINANT ASSESSMENT REPORT

MCRD
PARRIS ISLAND
SOUTH CAROLINA

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DATE 3-3-97

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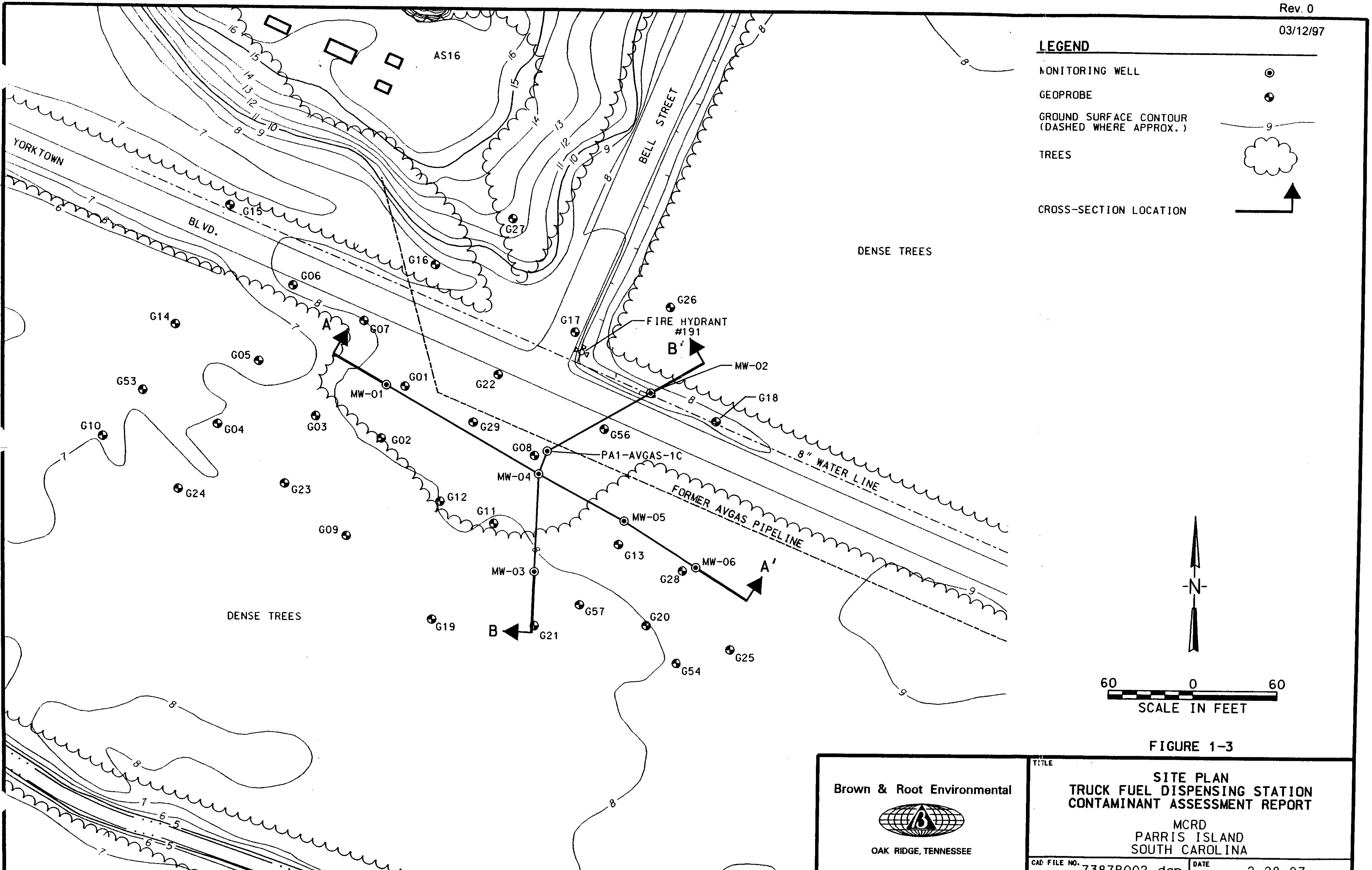

FIGURE 1-3

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

SITE PLAN
TRUCK FUEL DISPENSING STATION
CONTAMINANT ASSESSMENT REPORT

MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B002.dgn	DATE 2-28-97

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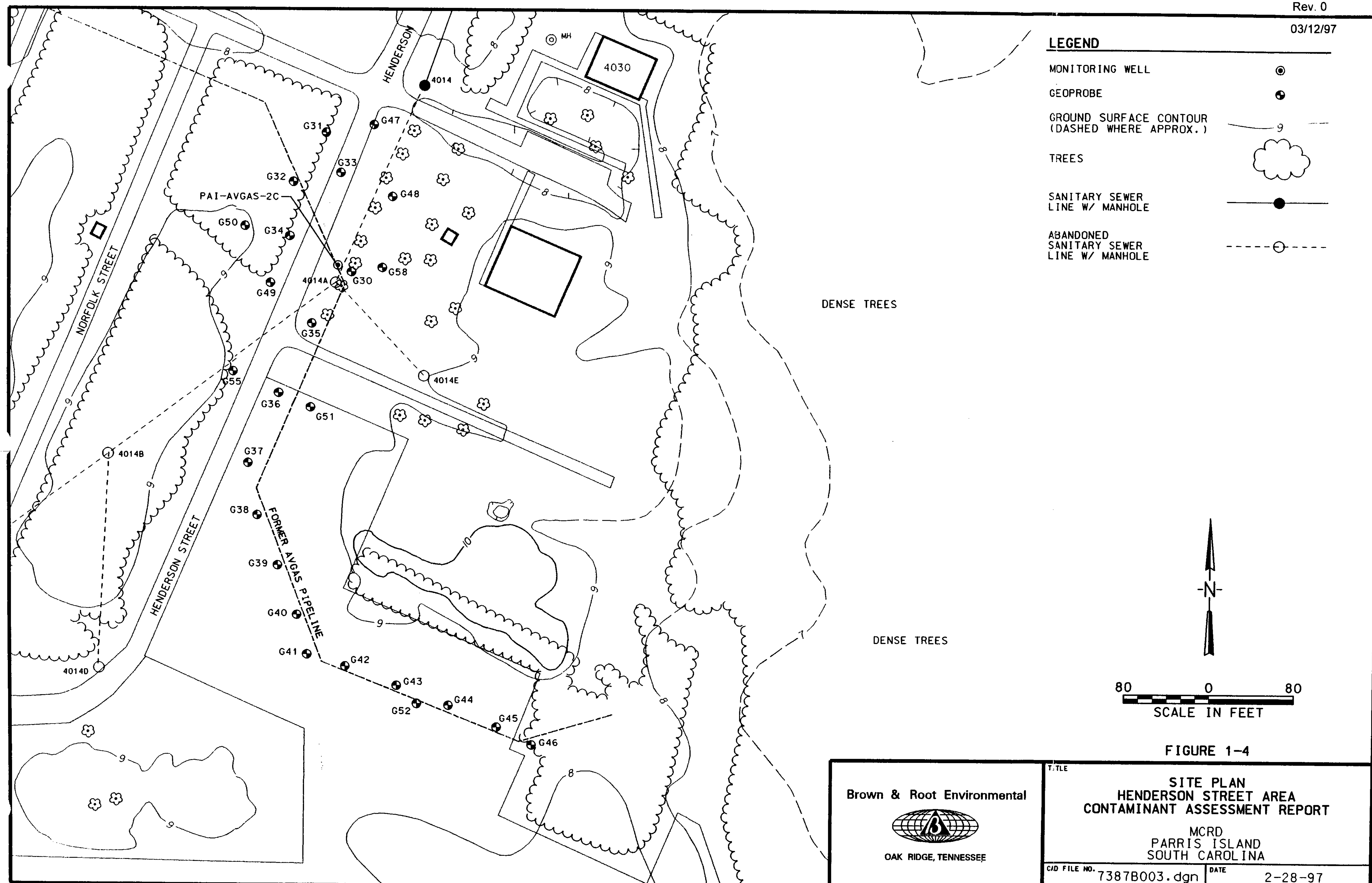

FIGURE 1-4

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

SITE PLAN
HENDERSON STREET AREA
CONTAMINANT ASSESSMENT REPORT

MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B003.dgn

DATE 2-28-97

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CTO 0018

1.2 OBJECTIVE

Previous site investigation activities that were performed at the site include soil vapor screening and soil and groundwater sampling. Remedial actions were implemented to remove the source of contamination at the site that included excavation and removal of all underground piping and surrounding contaminated soil. Details of the previous investigative and remedial activities are presented in Section 2.0.

In response to the Revised Corrective Action Plan (RUST E&I, 1995) prepared for the AVGAS pipeline site, the SCDHEC (letter dated May 13, 1996) requested the submission of a Contamination Assessment Report (CAR) to address the soil and groundwater impacts at the Truck Fuel Dispensing Station and along the portion of the former AVGAS pipeline from Henderson Street to the location of previous soil sample PI-16049. The investigations were required because the levels of constituents remaining in soils and groundwater were above the SCDHEC Risk Based Screening Levels (RBSLs).

This CAR describes the results of the field investigation program that was performed to assess the vertical and horizontal extent of petroleum hydrocarbon contamination remaining along the former UST 000002 AVGAS Pipeline at the MCRD Parris Island. This CAR presents the overall investigation strategies, facility background information, investigative and analytical procedures, and results of the investigation. The information obtained from this investigation will be used to determine the need for remediation and if required, to establish the remedial action required to protect human health and the environment and comply with SCDHEC regulations.

2.0 SITE BACKGROUND

The previously submitted Contamination Assessment Report (Sirrine Environmental Consultants, Inc., 1991) and Revised Corrective Action Plan (RUST E&I, 1995) were used to compile the following discussion of the site, regional and site-specific hydrogeology, and previous remedial actions at the site. Details can be found in the referenced documents.

2.1 SITE DESCRIPTION

The AVGAS pipeline is located in the Page Field area of the MCRD Parris Island. The pipeline was used to transport AVGAS from AS-18 to AS-16, through the Truck Fuel Dispensing Station, and finally to the fueling hydrants located in the old hangar area of Page Field. The steel pipeline consisted of twin 6 inch diameter lines which were reduced to 5 inch diameter in the vicinity of the old hydrant locations. The pipeline was abandoned and excavated in March 1995.

Sites AS-16 and AS-18 are not part of this CAR investigation, however the USTs at these sites may have previously impacted soil and groundwater in the site vicinity. Therefore their location and general descriptions are thought to be relevant. The AS-16 tank farm consisted of four 25,000 gallon, steel AVGAS USTs which were 10 ft in diameter and 40 ft long. The tanks were installed at grade and then covered with approximately 4 ft of soil. The AS-18 tank farm consisted of four 50,000 gallon AVGAS USTs. The tanks were constructed of pre-stressed concrete and installed prior to June 1943 as vertical cylinders and were constructed of pre-stressed concrete. The tanks were installed at grade and then covered with approximately 5 ft of soil. The AS-16 and AS-18 USTs have been closed in place and are not part of this investigation.

2.2 REGIONAL HYDROGEOLOGY

2.2.1 Surficial Aquifer

MCRD Parris Island is located in the Lower Coastal Plain Province of South Carolina and is characterized by flat terrain dissected by rivers and streams which flow into the Atlantic Ocean.

The surficial or water table aquifer in the project area is restricted to the shallow, Pliocene to Holocene age, coarse grained sedimentary deposits of the Pamlico and Waccamaw Formations (Hughes, et al, 1989). The hydraulic characteristics of these formations are not particularly well known since the surficial aquifer is primarily used for domestic purposes. A few shallow monitoring wells on St. Helena and Ladies Islands have been hydraulically tested. An estimated transmissivity of 1300 ft^2/day with a storage coefficient of 0.20 has been reported for coarse sands within the shallow deposits (Hassen, 1985).

2.2.2 Confining Layer

The surficial aquifer is underlain by the Miocene age Hawthorn Formation (Hughes, et al, 1989). The Hawthorn Formation is significant in that it hydraulically separates the unconfined surficial aquifer from the underlying artesian Floridan aquifer. The elevation at the top of the Hawthorn is reported to be approximately -30 feet msl at Parris Island. Thickness of the Hawthorn Formation in this area is reported to range from about 25 feet to as much as 40 feet near the confluence of the Beaufort and Broad Rivers (Hughes, et al, 1989). Previous regional studies have indicated a wide range of vertical hydraulic conductivity values for samples obtained from the Hawthorn Formation. Hughes, et al (1989) calculated the leakage through the Hawthorn Formation to be 0.0002 ft^3/day for every foot of head difference (using an average formation thickness of 30 feet and vertical hydraulic conductivity of 0.006 ft/day).

The Hawthorn Formation is reported to be breached in numerous locations throughout Beaufort County. Immediately adjacent to Parris Island, tidal scour and channel erosion may have breached the Hawthorn Formation beneath the Beaufort and Broad Rivers (Hughes, et al, 1989). Smith (1987) reported a small area of recharge to the Upper Floridan at the southeastern end of Parris Island.

2.2.3 Floridan Aquifer

The principal source of groundwater used for consumption in the Beaufort County area is the Floridan aquifer (Smith, 1987). This artesian aquifer system has a total thickness of approximately 900 feet and is divided into the Upper Unit and the Lower Unit.

2.3 SITE-SPECIFIC HYDROGEOLOGY

Based upon previous investigations at the site, the upper twenty feet of sediment consists of very fine yellow-brown sand with traces of clay and silt with thin (approximately 6 inches thick), discontinuous layers of greenish-gray silty clay.

The water table surface was previously encountered at an elevation of approximately 3 feet above mean sea level (msl). The ground surface elevation in the vicinity of the AVGAS pipeline is approximately 8.0 to 8.5 feet msl, therefore, the surficial water table exists at a depth of approximately 5.0 to 5.5 feet below ground surface at the site. The water table has been documented to vary by approximately 2 feet depending upon the amount of recent precipitation. In general, the water table falls during the dry summer months and rises during the winter months due to increased precipitation.

During previous investigations (Sirrine Environmental Consultants, Inc., 1991) the following hydraulic parameters were calculated for the AS-18 site:

- hydraulic gradient = 0.0046 ft/ft
- average hydraulic conductivity = 4.95 ft/day

Using an assumed effective porosity of 0.20 (USEPA/530-SW-89-026), the calculated seepage velocity (average linear velocity) is estimated to be 0.11 ft/day.

The groundwater flow direction at facility AS-18 has been stated to be toward the north (McClelland Consultants, Inc., 1990) and toward the south (Sirrine Environmental Consultants, Inc., 1991). The groundwater flow direction at facility AS-16 is reportedly to the west (McClelland Consultants, Inc., 1990). These disparate flow directions indicate the low lying nature of the site and the effects of nearby surface water bodies and marsh areas on the groundwater flow direction at any specific location. It is also expected that the high percentage of paved areas will greatly affect the groundwater flow directions and gradients at this site, particularly after a precipitation event.

2.4 WATER WELL INVENTORY

A receptor survey was conducted at the MCRD Parris Island in November 1996 by touring the base and interviewing MCRD Parris Island personnel. There are no domestic or public water supply wells within 1000 feet of the AVGAS pipeline, but two former water supply wells are located at the MCRD Parris Island. The nearest well is 1.3 miles west of the AVGAS pipeline and the other well is 1.8 miles north of the AVGAS pipeline, both wells are inactive. Potable water for Parris Island is supplied by the Beaufort-Jasper Water Sewer Authority.

2.5 PREVIOUS INVESTIGATIONS

Sites AS-16 and AS-18 were originally identified in the Initial Assessment Study (IAS) performed by the Naval Energy and Environment Support Activity (NEESA) in September 1986. The sites were further investigated during the Remedial Investigation Verification Step performed in May 1990 by McClelland Consultants, Inc. No contamination was detected at AS-16, however, petroleum constituents were identified in soil and groundwater at AS-18. Upon completion of the Verification Step both sites were transferred to the Underground Storage Tank program for additional investigation and remediation. The AVGAS pipeline was not identified as a separate site in the IAS or the Verification Step.

A Contamination Assessment Report (CAR) was prepared by Sirrine Environmental Consultants, Inc. in April, 1991, for the AS-18 tank farm and AVGAS pipeline. The objective of the CAR investigation was to determine whether an AVGAS release had occurred at the site that could have adversely impacted soil. Ten shallow soil borings were drilled along the AVGAS pipeline (PAI-AVGAS-1B through PAI-AVGAS-10B). The soil sample results indicated that a release of AVGAS had occurred during the pipeline's operational history. Figure 2-1 presents the locations of the ten soil borings along with the concentrations of total petroleum hydrocarbons (TPH) and total benzene, toluene, ethylbenzene, and total xylene (BTEX) constituents. Lead concentrations above the detection limits in five of the ten samples analyzed ranged from 1.4 ppm to 9.0 ppm. The CAR recommended additional soil sampling and analyses as well as closure and excavation of the pipeline. Groundwater samples were not collected as part of the CAR investigation.

Subsequent to the 1991 CAR a Final Remedial Action Plan (RAP) was prepared in August 1993 by RUST E&I for the AVGAS pipeline. The final RAP recommended excavation and removal of the pipeline along with additional sampling. During February and March, 1995, Bechtel Environmental, Inc. (Bechtel) was contracted to implement the Final RAP.

Bechtel subsequently excavated and removed the AVGAS pipeline and surrounding impacted soils, collected approximately 65 confirmatory soil samples from the excavation, performed soil vapor screening, and installed and sampled two groundwater monitoring wells along the AVGAS pipeline where soil sampling results revealed the highest concentrations of the constituents of concern.

Monitoring well PAI-AS16-1C (renamed PAI-AVGAS-1C) was installed along Yorktown Street near the former site of the Truck Fuel Dispensing Station. PAI-AS16-2C (renamed PAI-AVGAS-2C) was installed east of Henderson Street. The locations of the two monitoring wells are shown on Figure 1-2.

Both monitoring wells were constructed with a 15-foot screen section from 2.5-feet to 17.5-feet below ground surface. Well drilling logs for the two monitoring wells are included in Appendix D. Groundwater analytical results for the two monitoring wells are presented in Table 2-1. The groundwater sampling data was compared to the Groundwater RBSLs and to the South Carolina drinking water maximum

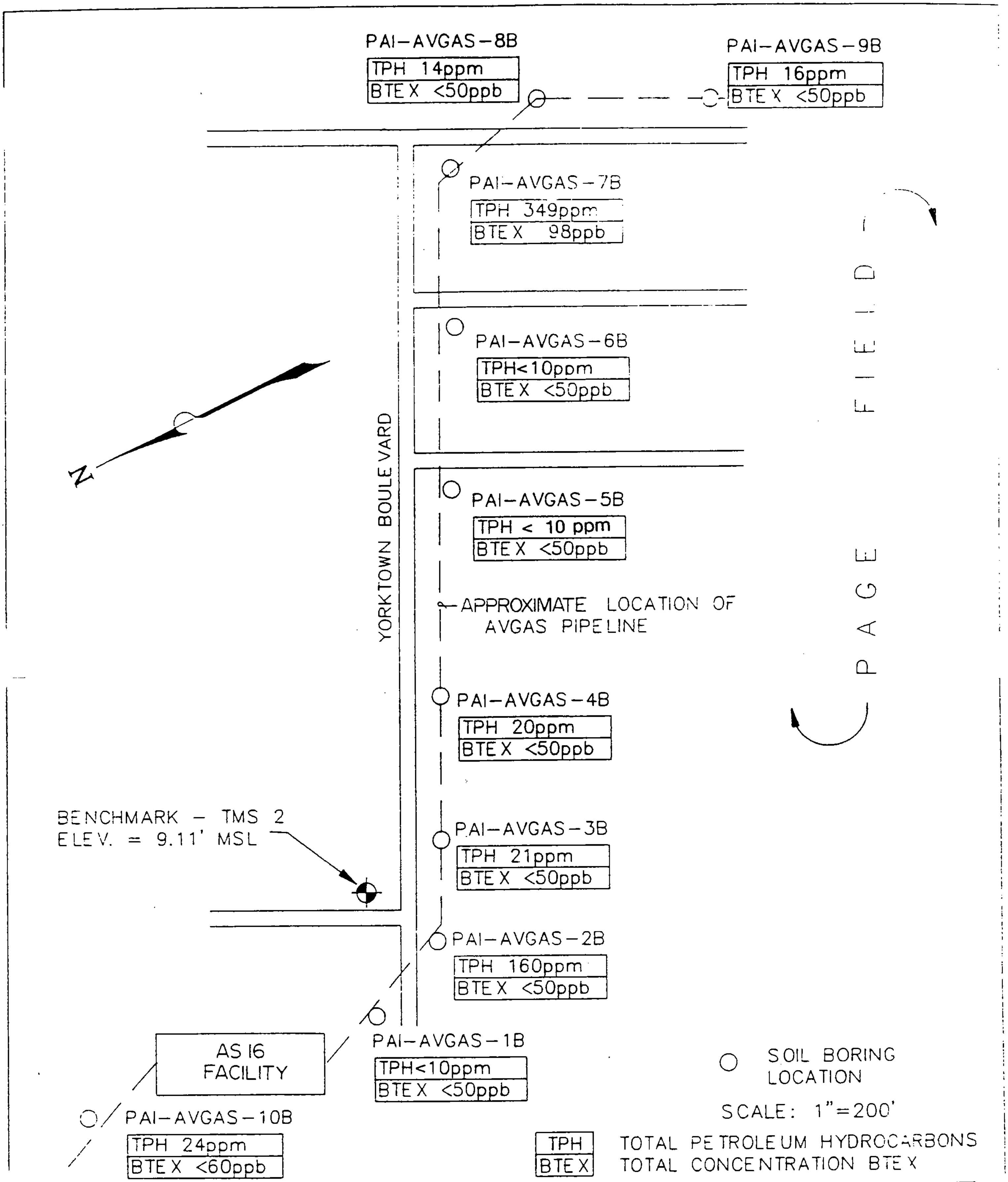


FIGURE 2-1

HYDROCARBON CONCENTRATION
IN SOILS
AVGAS-PIPELINE

CONTAMINATION ASSESSMENT
M C R D PARRIS ISLAND

REF: Sirrine Environmental Consultants, 1991

TABLE 2-1

GROUNDWATER MONITORING WELL SAMPLING RESULTS
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE #15459
REFERENCE: RUST E&I, 1995

Monitoring Well (Sampling Date)	Analyzed parameter	Results	Drinking Water MCL	Groundwater RBSL
PAI-AVGAS-1C (14 Apr 95) (Analyzed as PAIAS16Y)	Benzene	2250 (D)	5	5
	Toluene	2630 (D)	1000	1000
	Ethylbenzene	3650 (D)	700	700
	Xylenes (Total)	9500 (D)	10000	10000
	MTBE	5000 (UD)	–	40
	TPH	52200 (D)	–	–
	Lead	–	15*	–
PAI-AVGAS-2C (14 Apr 95) (Analyzed as PAIAS16H)	Benzene	3.03	5	5
	Toluene	2.89	1000	1000
	Ethylbenzene	7.73	700	700
	Xylenes (Total)	17.8	10000	10000
	MTBE	50 (U)	–	40
	TPH	148	–	–
	Lead	11	15*	–

Note: Groundwater Risk Based Screening Levels (RBSLs) obtained from SCDHEC Guidance Document "Risk Based Corrective Action for Petroleum Releases," June 1995.

Legend

– Data Not Available or Established
* EPA Action Level

Concentration Above Drinking Water MCL and/or Groundwater Risk Based Screening Level

Concentration Below Detection Limit, But Above Groundwater Risk Based Screening Level

General Note All Concentrations are Reported in µg/l (ppb)
* EPA Action Level

Soil Sample Qualifiers

(U) Concentration Below detection Limit
(D) Value Derived by Dilution

contaminant levels (MCLs). The groundwater samples contained detectable concentrations of petroleum hydrocarbons. Benzene, toluene, ethylbenzene, and lead in the groundwater at PAI-AS16-1C exceeded South Carolina Groundwater RBSLs and drinking water MCLs.

The results of the additional investigative and remedial activities were presented in the December 1995, Revised Corrective Action Plan (CAP) (RUST E&I, 1995).

2.6 REMEDIAL ACTIONS

2.6.1 <u>Underground Piping Removal</u>

The AVGAS Pipeline is reported to have been out of service for many years, since at least 1950. As discussed previously, the 1993 Final RAP (RUST E&I, 1995) recommended that the piping be physically excavated and removed from the site. In March 1995, a total of 4,603 linear feet of underground piping was excavated and removed by Bechtel.

During the removal activities, the steel piping revealed signs of extensive corrosion, particularly at the fuel hydrant locations at Page Field and at the piping bends.

2.6.2 <u>Soil Vapor Screening</u>

Soil vapor screening was conducted during the AVGAS pipeline removal operations using an Organic Vapor Analyzer (OVA). Soil vapor screening analysis was used during the pipeline excavation to determine the lateral extent of soil removal operations. Impacted soils were removed laterally to the extent where soil headspace readings were less than or equal to 50 ppm (OVA reading) under concrete paved areas and less than or equal to 10 ppm (OVA reading) in other, unpaved areas.

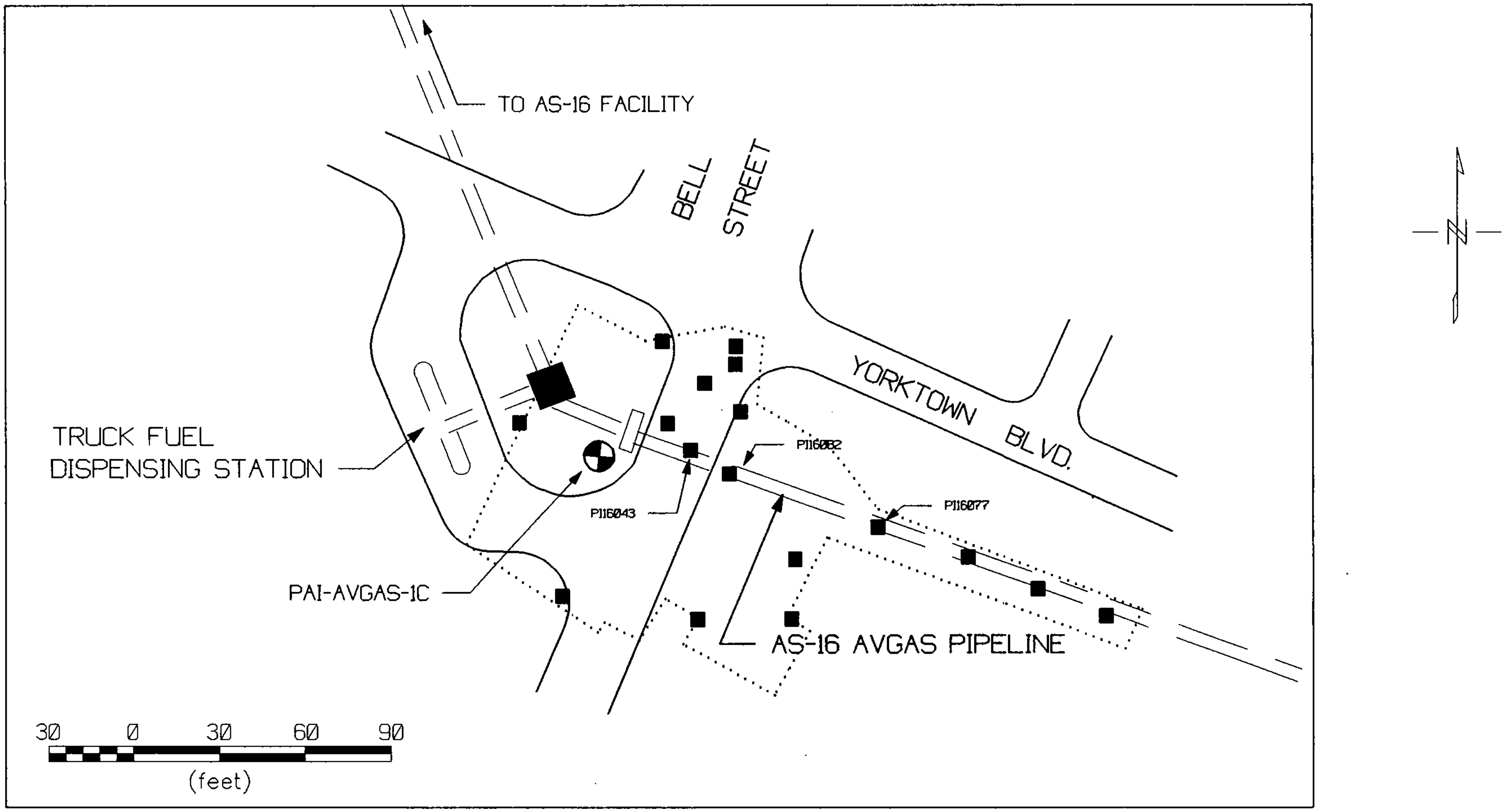
2.6.3 <u>Contaminated Soil Removal</u>

During the removal action, approximately 2,663 tons of petroleum impacted soil were excavated and disposed. Excessively impacted soils were removed to the depth of the water table which was approximately 3 feet below grade at the time. Typically the excavation was 4 feet wide along the pipe route. Lateral excavation beyond the immediate area of the piping was required at the Truck Fuel

Dispensing Station and where the pipeline crossed Henderson Street (see Figures 2-2 and 2-3, respectively). The excavated areas were backfilled with clean fill. Impacted soils were disposed as nonhazardous, fuel contaminated soil at the Hickory Hill Landfill in Hilton Head, South Carolina.

Approximately 65 confirmatory soil samples were collected from the excavation for BTEX, MTBE, TPH-VOL fraction, and lead analyses. Confirmatory soil sampling locations in the vicinity of the Truck Fuel Dispensing Station and where the pipeline crossed Henderson Street are shown on Figures 2-2 and 2-3, respectively. Table 2-2 presents the results of the analyses at those specific sample locations.

Analytical results from the soil samples taken along the pipeline excavation route indicated BTEX constituents above the SCDHEC RBSLs for sandy soil. The referenced RBSLs are contained in the June 1995, SCDHEC Guidance entitle "Risk-Based Corrective Action for Petroleum Releases". The RBSLs for sandy soil were used under SCDHEC guidance to assist in assessing current and future corrective action for the site.



LEGEND:

MONITORING WELL

PREVIOUS INVESTIGATIONS SOIL SAMPLE LOCATIONS

LIMITS OF EXCAVATION

TRUCK FUEL DISPENSING STATION

MCRD PARIS ISLAND, SOUTH CAROLINA

Figure 2-2

Brown & Root Environmental

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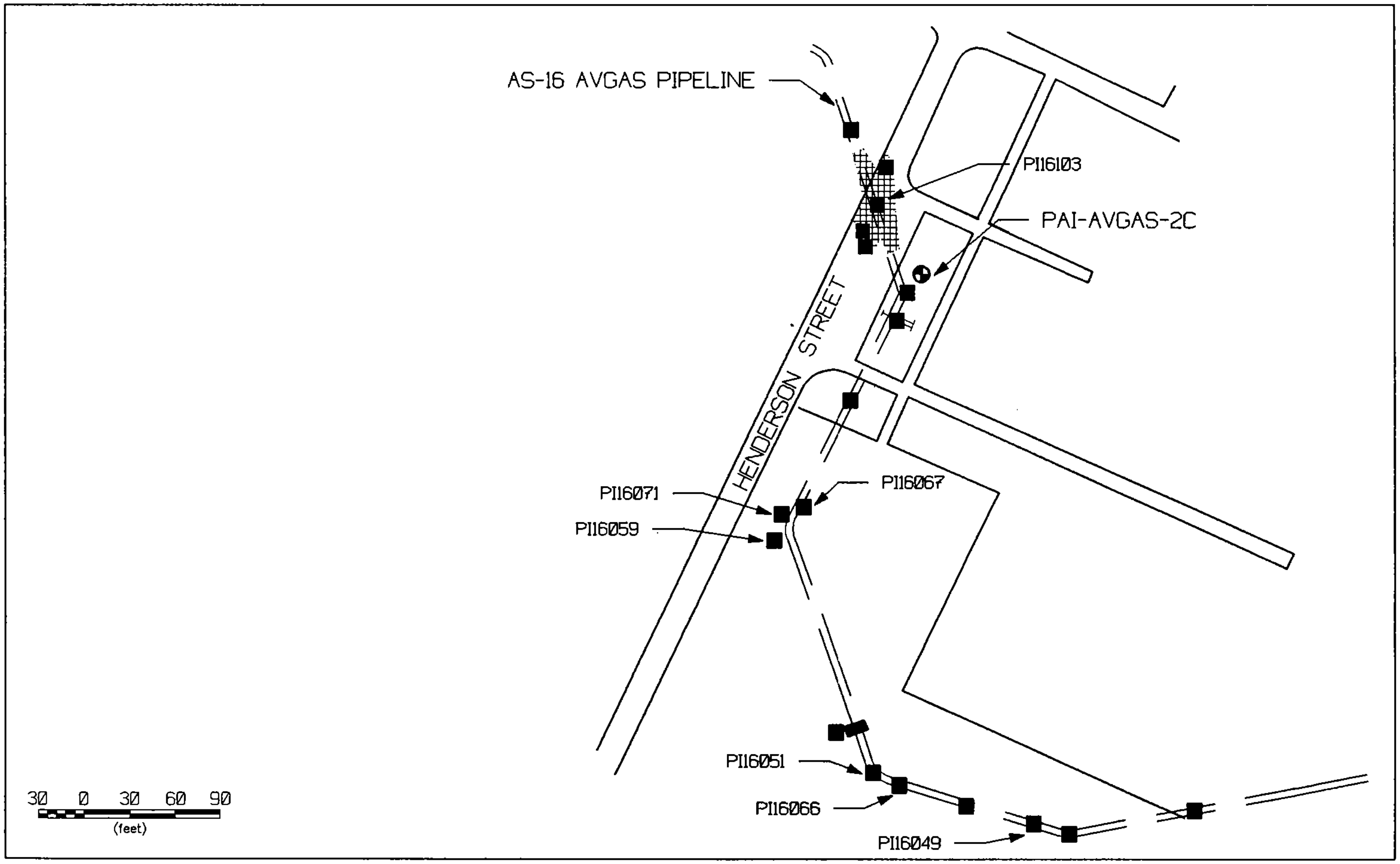
CTO 0018



LEGEND:

MONITORING WELL

PREVIOUS INVESTIGATIONS
SOIL SAMPLE LOCATIONS

'TS OF EXCAVATION

HENDERSON STREET DETAIL

MCRD PARIS ISLAND, SOUTH CAROLINA

Figure 2-3

Brown & Root Environmental

TABLE 2-2

SOIL SAMPLING RESULTS EXCEEDING RBSLs
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE # 15495
REFERENCE: RUST E&I, 1995

Soil Sample	Benzene RBSL = 7	Toluene RBSL = 1700	Ethylbenzene RBSL = 1500	Xylenes RBSL = 4000	MTBE No RBSL	TPH No RBSL	LEAD No RBSL
TRUCK FUEL DISPENSING STATION							
PI16043	127 (U)	485 (U)	1000 (U)	1020 (U)	3160 (U)	6920000	6810 (U)
PI16077	295	482	314	722	649 (U)	1730	3030 (J)
PI16082	23200 (E)	89900 (E)	138000 (E)	264000 (E)	298000 (UE)	3100000 (E)	45200
HENDERSON STREET AREA							
PI16049	4220	1680	1270 (U)	2530 (U)	31600 (U)	499000	7780
PI16051	216	183	228	127 (U)	1580 (U)	26600	19000
PI16059	7.05 (D)	10.3 (D)	5 (U)	23 (D)	125 (U)	2180	5100 (B)
PI16066	55.8 (D)	64.3 (D)	182 (D)	12.1 (J)	625 (U)	6700 (D)	3500 (B)
PI16067	61.2 (D)	96 (D)	56.5 (D)	56.8 (D)	305 (U)	13100 (D)	60500
PI16071	323 (U)	350	668	5820	8060 (U)	161 (U)	17900
PI16103	10800 (U)	10800 (J)	15500	21500 (J)	269000 (U)	995000	44500

Notes: All concentrations are Reported in ug/kg
(U) Concentration Below Detection Limit
(J) Estimated Value; Concentration is Between Detection Limit and Reporting Limit
(E) Out of Calibration Range
(B) Compound was also Detected in the Method Blank
(D) Value Derived by Dilution

3.0 FIELD INVESTIGATION OBJECTIVES AND METHODS

3.1 OBJECTIVES

In response to the Revised Corrective Action Plan (RUST E&I, 1995), the SCDHEC requested the submission of a Contamination Assessment Report (CAR) to address the soil and groundwater impacts at the Truck Fuel Dispensing Station and along the portion of the AVGAS pipeline from Henderson Street to the location of previous soil sample PI-16049. The total piping distance of these two areas is approximately 1110 feet and includes approximately 60 feet of ancillary line and the fueling islands at the former Truck Fuel Dispensing Station.

The investigations were required because the levels of constituents remaining in soils at some previous sampling locations exceed the RBSLs for sandy soils. These locations include PI-16021 PI-16051, PI-16059, PI-16066, PI-16067, and PI-16071. Also, because both of the existing monitoring wells (PAI-AVGAS-1C and PAI-AVGAS-2C) were constructed utilizing 15-foot screens the groundwater samples collected from the wells may have been diluted below the true in-situ concentration. In addition, the analytical results for MTBE at monitoring well PAI-AVGAS-2C had a detection limit of 50 ppb which is higher than the groundwater RBSL of 40 ppb. Therefore, additional groundwater characterization was required by SCDHEC.

3.2 INVESTIGATION SUMMARY

The project field work consisted of three general phases of field activities. The first phase included soil and groundwater screening. The second phase included monitoring well installation, aquifer testing, soil sampling, and groundwater sampling. The third phase occurred after receipt of laboratory analytical results and included the removal and disposal of the investigation derived waste (IDW). An itemized list of the tasks performed during each phase is presented below.

<u>Phase I</u>

- field mobilization activities
- performed soil gas screening for BTEX and MTBE at 55 locations
- using direct-push technology, collected and analyzed 23 groundwater samples for BTEX and MTBE using a field gas chromatograph (GC)

Phase II

- drilled, installed, and sampled (for full analyses) 5 shallow monitoring wells
- drilled, installed, and sampled (for full analyses) one deep vertical extent monitoring well
- collected one soil sample (for full analyses) from each of the 6 well borings
- performed slug tests on each of the 6 newly installed monitoring wells
- collected two rounds of synoptic water level measurements from all on-site monitoring wells
- surveyed each of the 6 newly installed monitoring wells
- conducted an inventory of private and public water supply wells
- mapped underground utilities
- collected one soil sample for TOC and grain-size analysis
- collected one soil sample of drill cuttings for IDW characterization
- collected water samples from drummed water for IDW characterization

Phase III

- Disposed of soil cuttings and water IDW.

The results of the groundwater screening analyses of the 23 temporary well points helped define the extent of the groundwater plume and assisted in the selection of the permanent monitoring well locations. The data collected from the temporary well points was plotted on a map and permanent monitoring well locations were selected. The proposed permanent monitoring well locations were submitted to SCDHEC for approval prior to installation.

3.3 SOIL GAS SCREENING INVESTIGATION

A quantitative soil gas screening investigation, was conducted along two areas of the former AVGAS pipeline to help determine/define the existence/extent of the contaminated soil and groundwater to assist in the selection of the temporary groundwater sample locations. The screening samples were obtained using direct-push technology (DPT) equipment. DPT refers to sampling tools that are driven directly into the ground without the use of conventional drilling equipment (e.g., Geoprobe®). DPT utilizes hydraulic pressure and/or percussion hammers to advance the sampling tools. Advantages of DPT over conventional drilling techniques include the generation of little or no investigation derived waste, and the ability to sample soil, soil gas, and groundwater in a rapid, cost effective manner without installing unnecessary permanent monitoring wells.

The procedure used for collection of the soil gas samples was as follows:

- An expandable steel drive point was attached to a 3-foot drive rod and driven into the ground using a Geoprobe®-type hydraulic vehicle. The rod was driven to a target depth just above the water table.
- The rod was retracted a sufficient distance to leave a space for the soil gas to enter the drive point (approximately six inches) such that the vapors in the hole were allowed to reach equilibrium conditions (approximately 5 minutes).
- After the drive point and drive rod had been retracted, polyethylene tubing was inserted into the rod.
- The sampling tube was connected to the inlet side of a peristaltic air pump. The discharge side of the pump was connected to a 1-liter Tedlar bag.
- The Tedlar bag was filled to adequately purge the ambient air that existed in the bag.
- The soil gas sample was then collected in the Tedlar bag, sealed when full, transported to the field GC, and analyzed for BTEX and MTBE.
- All equipment was purged to remove residuals prior to moving to the next location.
- After all sampling tools were removed, the small diameter hole was sealed from the bottom up to the ground surface by pouring bentonite chips into the open hole. The chips were hydrated and allowed to swell.

3.4 GROUNDWATER SCREENING

Groundwater grab samples were collected at 23 selected locations using DPT procedures. The locations of the groundwater grab samples were selected based upon the results of the soil gas investigation. Each sample was collected in a similar fashion as the previously described soil gas samples with the exception that the probe rod was pushed into the saturated zone and a low-flow peristaltic pump was used to collect the groundwater grab samples. The samples were then transported to the field GC for analysis of BTEX and MTBE by EPA Method 8020. If significant contamination was detected in any of the initial screening samples, additional sample locations were added and analyzed until the horizontal extent of the groundwater plume had been sufficiently identified to select the location of the permanent monitoring wells.

Upon completion of groundwater sample collection, each small diameter hole was sealed from the bottom up to the ground surface by pouring bentonite chips into the open hole. The chips were hydrated and allowed to swell.

The analytical results from the groundwater grab samples were plotted on a scaled site map. Permanent monitoring well locations were proposed and submitted to the SCDHEC for approval. The next phase of the field work that included soil sampling and monitoring well installation and sampling began after approval of the monitoring well locations was received from SCDHEC.

3.5 SOIL SAMPLING

Soil sampling was only conducted during the drilling of the permanent monitoring wells. The borings were sampled continuously to the top of the water table (approximately 3-5 feet below grade) then at 5-foot intervals for shallow wells and continuously for the deep well to the proposed termination of the well boring (approximately 12 ft bls for the shallow wells and 24 ft bls for the deep well). Soil samples were retrieved using split-spoon samplers that were 2 inches in diameter and 2 feet in length. One sample was collected immediately above the top of the water table from each boring for laboratory analysis.

The soil samples were analyzed for the following constituents:

- benzene, toluene, ethylbenzene, and total xylene (BTEX) by EPA Method 8260;
- methyl tertiary butyl ether (MTBE) by EPA Method 8260;
- naphthalene by EPA Method 8260 ('worst case' well boring only);
- TPH-GRO by Modified EPA Method 8015; and
- total lead by EPA Method 6010.

All samples obtained from the boreholes were monitored with a PID to determine the relative concentrations of volatile organic constituents.

A lithologic description was made of each split-spoon sample and a complete log of each boring was maintained by the on-site geologist. The following information was recorded on the boring logs:

- sample numbers and types,
- sample depths,
- Standard Penetration Test Data,
- sample recovery/sample interval,
- soil density or cohesiveness,
- soil color, and
- Unified Soil Classification System (USCS) material description.

In addition, depths of changes in lithology, sample moisture observations, depth to water, PID readings, drilling methods, and total depth of each borehole were included on each log as well as any other pertinent observations.

3.6 GROUNDWATER INVESTIGATION

Six permanent monitoring wells were drilled at the site, including one upgradient well, during the CAR investigation. The locations of the monitoring wells were determined by the groundwater screening results. In addition to the shallow monitoring wells, one deep monitoring well was installed at the site to characterize lithology and to investigate vertical extent of contamination. The deep well was installed to a depth of 24 feet bls to the top of the Hawthorn Formation (confining layer). Well installation permits were obtained from SCDHEC prior to well installation activities.

3.6.1 Monitoring Well Installation

Hollow-stem augers were used to install the shallow monitoring wells and mud rotary drilling to install the deep monitoring well. Monitoring wells were constructed of 2-inch inside diameter (I.D.), schedule 40, flush-joint PVC riser pipe and flush-joint factory slotted well screen. Screen slots were 0.01 inch. With the exception of the deep monitoring well, the top of the screened interval was positioned approximately 1-2 feet above the water table. Screen lengths were 10 feet in length except the deep well which had 5 feet of screen. After the borings were drilled to the desired depth, the wells were installed through the augers. A silica sand pack (U.S. Standard Sieve size 20/30) was installed into the boring annulus around the well screen as the augers were withdrawn from the boring.

In some of the shallower monitoring wells it was necessary to limit the sand pack to only 1 foot above the top of the screen to allow enough room for a sufficient bentonite seal. A bentonite pellet seal approximately 2 feet thick was installed above the sand pack and allowed to hydrate as per the manufacturer's recommendation. As with the sand pack, in some of the shallow water table wells it was necessary to install only a 1-foot bentonite seal. The remainder of the annulus of the boring (from the seal to ground surface) was backfilled with a bentonite/cement grout. A monitoring well construction log was completed for each well installed.

A 4-inch-diameter protective steel casing equipped with a locking steel cap was installed around all wells except the flush mounted well (MW-2). A concrete pad measuring 3 feet by 3 feet was constructed equally portioned around the casing of each well. For wells in high traffic areas, four marker posts (4-inch nominal diameter, 7-foot-long steel pipe filled with concrete) were placed outside of each concrete apron.

The monitoring wells were developed no sooner than 24 hours after installation to remove fine material from the area around the monitored interval of the well. Wells were developed by bailing and surging or by pumping as deemed appropriate by the field geologist. The pH, temperature, specific conductance, and turbidity were measured periodically during development. Wells were developed up to a maximum of one hour or until these parameters stabilized and the purged water was visibly clear. Water quality stabilization was determined using the following criteria: temperature +/-0.5°C, pH +/-0.1 unit, and specific conductivity +/-10 µmhos/cm.

3.6.2 Groundwater Sampling

Groundwater samples were obtained from the two existing and all new monitoring wells installed at the site. Prior to obtaining samples water levels were measured and the wells were purged using a dedicated bailer. Field measurements of pH, temperature, specific conductance and turbidity were recorded after each volume of water was purged. At least three well volumes were purged from the wells.

Single-well dedicated teflon bailers with polyethylene rope as bailing line were used for sample collection. The sample was poured directly from the bailer into the appropriate sample bottles for analysis. Samples analyzed for volatile constituents were collected first and immediately sealed in the vial so that no head space existed.

The groundwater samples were analyzed for the following constituents:

- benzene, toluene, ethylbenzene, and total xylene (BTEX) by EPA Method 8260;
- methyl tertiary butyl ether (MTBE) by EPA Method 8260;
- naphthalene by EPA Method 8260 ('worst case' well only);
- TPH-GRO by Modified EPA Method 8015; and
- total lead by EPA Method 7421

All pertinent field and sampling data was recorded on a groundwater sample collection form and in the field logbook.

3.6.3 Groundwater Level Measurements

Two rounds of synoptic water-level measurements were recorded at all monitoring wells at the site. Measurements were taken with an electric water-level indicator using the top of the PVC well casing as the reference point for determining depths to water. Water-level measurements were recorded to the nearest 0.01 foot in the field logbook.

3.6.4 Slug Tests

Upon completion of the groundwater level measurements, rising-head slug tests were conducted on the six newly installed monitoring wells. The tests were conducted to estimate the hydraulic conductivity of the aquifer at the site. The water level response data was collected using pressure transducers and an In Situ electronic data logger. The resulting change in head versus time data was analyzed using AQTESOLV™ computer software and the appropriate method for unconfined, granular aquifers (Geraghty & Miller, Inc., 1994).

3.6.5 Surveying

Surveying of monitoring wells was conducted and certified by a South Carolina State Registered Land Surveyor (Christensen-Khalil Surveyors, Inc.) The surveying subcontractor reported all elevations referenced to mean sea level. The soil-gas points and temporary well points were field located and referenced to existing features.

After installation, the ground surface, and the top of the PVC riser pipe of each monitoring well was surveyed to within 0.01-foot vertical accuracy by a State-certified land surveyor. In addition, the well location was surveyed to a 0.1-foot horizontal accuracy.

3.7 EQUIPMENT DECONTAMINATION

The equipment involved in field sampling activities was decontaminated prior to and during drilling and sampling activities. This equipment included drilling rigs, downhole tools, augers, soil and water sampling equipment.

3.7.1 Major Equipment

All downhole drilling equipment, including drilling and sampling tools, were steam cleaned prior to beginning work, between boreholes, and at the conclusion of the drilling program.

These decontamination steps included washing equipment using high-pressure steam from a potable water supply and Alconox. The equipment was then rinsed with tap water. All decontamination activities took place at a temporary decontamination pad constructed at the apron area at Page Field.

3.7.2 Sampling Equipment

All equipment such as trowels, bailers and split spoon samplers used for collecting samples were decontaminated both prior to beginning field sampling and between samples. The following decontamination steps were taken:

- Tap water and Alconox or liquinox detergent wash.
- Tap water rinse.
- Rinse with Methanol.
- Air dry.

Field equipment such as pH, conductivity and temperature instrument probes were rinsed first with tap water, then with certified pure water, and finally with the sample liquid.

3.8 WASTE DISPOSAL

All drill cuttings were containerized and stored at a predetermined location at the project site until final disposition of the soil cuttings was determined.

Decontamination fluids, purge water, and development water were collected and containerized in DOT approved (Specification 17C) 55-gallon drums at the site and stored pending analysis to determine proper disposal. All drums were sealed and labeled with drum contents, well number, and date.

Following receipt of the analyses, decontamination fluids, purge water, and development water were discharged to the base industrial waste treatment plant (IWTP) in accordance with discharge limitations imposed by the facility.

4.0 SOIL GAS AND GROUNDWATER SCREENING INVESTIGATION

B & R Environmental conducted soil-gas analysis and groundwater screening for BTEX and MTBE along the former AVGAS pipeline at the truck fuel dispensing station and the Henderson Street area during the week of October 28, 1996. Both of these areas were investigated using DPT to collect soil-gas and groundwater samples for analysis using a mobile laboratory operated by Transglobal Environmental Geochemistry, Inc.(TEG) and certified by the State of South Carolina. Soil-gas and groundwater samples were collected using teflon tubing inserted into the subsurface through decontaminated probe rods and a peristaltic pump. New teflon tubing was used at each sampling location. Soil-gas and groundwater screening samples were analyzed for BTEX and MTBE by EPA Method 8020. Soil-gas results from 55 locations were used to select 23 locations at which groundwater samples were collected and screened.

4.1 SOIL GAS SCREENING INVESTIGATION

Soil-gas screening samples were collected from the unsaturated zone above the water table which averaged approximately 4 ft bls. The samples were collected using a DPT rig mounted on an all-terrain vehicle.

4.1.1 Truck Fuel Dispensing Station

Soil-gas samples were collected from 32 locations adjacent to the former AVGAS pipeline and the Truck Fuel Dispensing Station (Figure 4-1). Analytical results of the soil-gas screening are shown in Figure 4-1. Field laboratory analytical sheets and associated chain of custody forms are provided in Appendix A. Fourteen of the samples contained detectable concentrations of BTEX compounds in soil gas ranging from 1.1 micrograms per liter of vapor (ug/l-v) (G20) to 124 ug/l-v (G08). G08 is located next to existing monitoring well PAI-AVGAS-1C which had concentrations of benzene and total BTEX at 2250 ug/l and 18,030 ug/l, respectively, in the groundwater in April 1995. The majority of all soil-gas locations with detections are in the immediate vicinity where fuel trucks unloaded fuel and where the former AVGAS pipeline crossed Yorktown Boulevard. All soil-gas locations with detections were bounded by sampling points with no detections or significantly decreasing concentrations (e.g., G01 to G16) in the soil gas.

4.1.2 Henderson Street Area

Soil-gas samples were collected from 23 locations along the former AVGAS pipeline at the Henderson Street Area (Figure 4-2). Analytical results of the screening analysis at the Henderson Street Area are

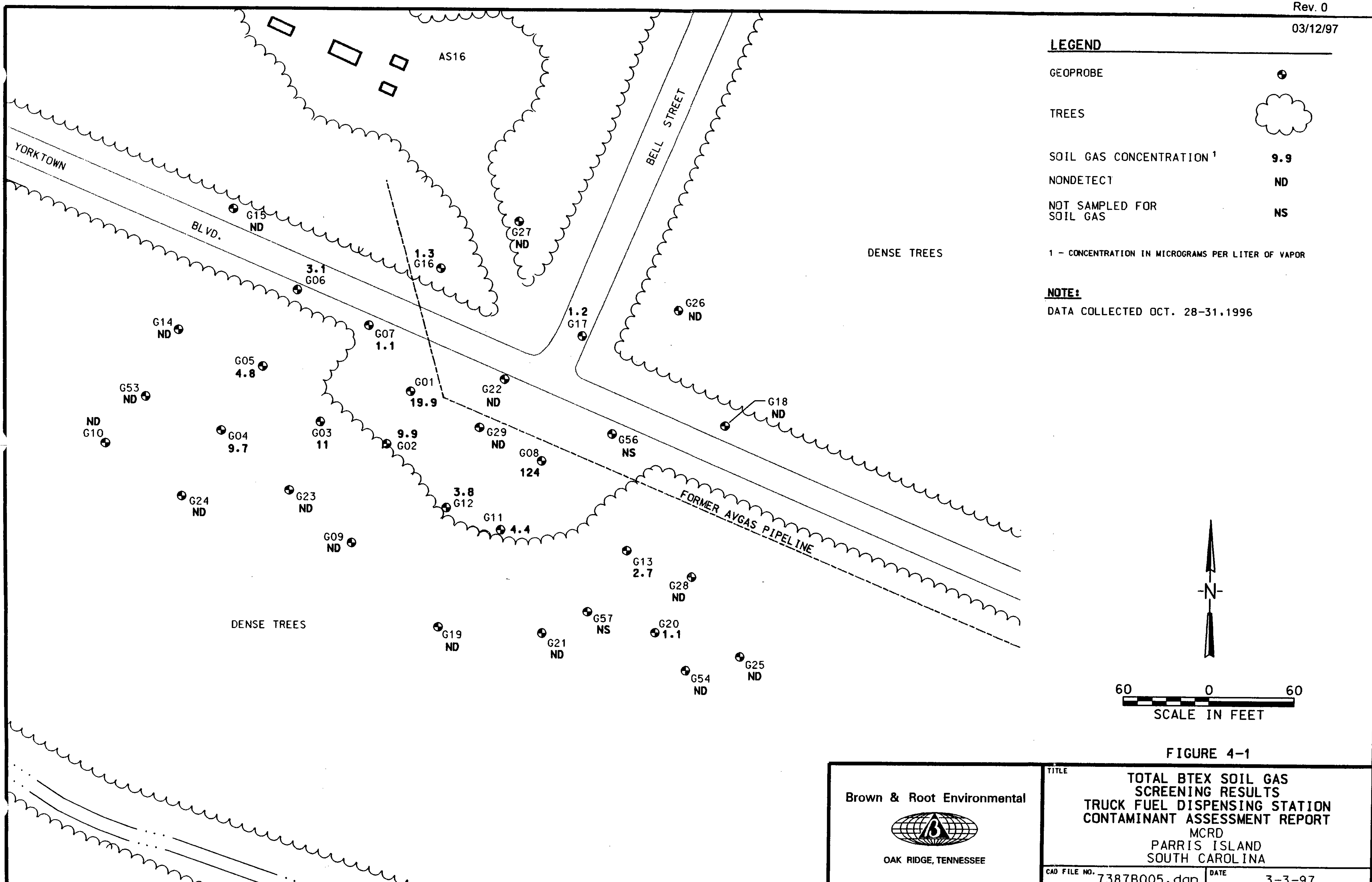


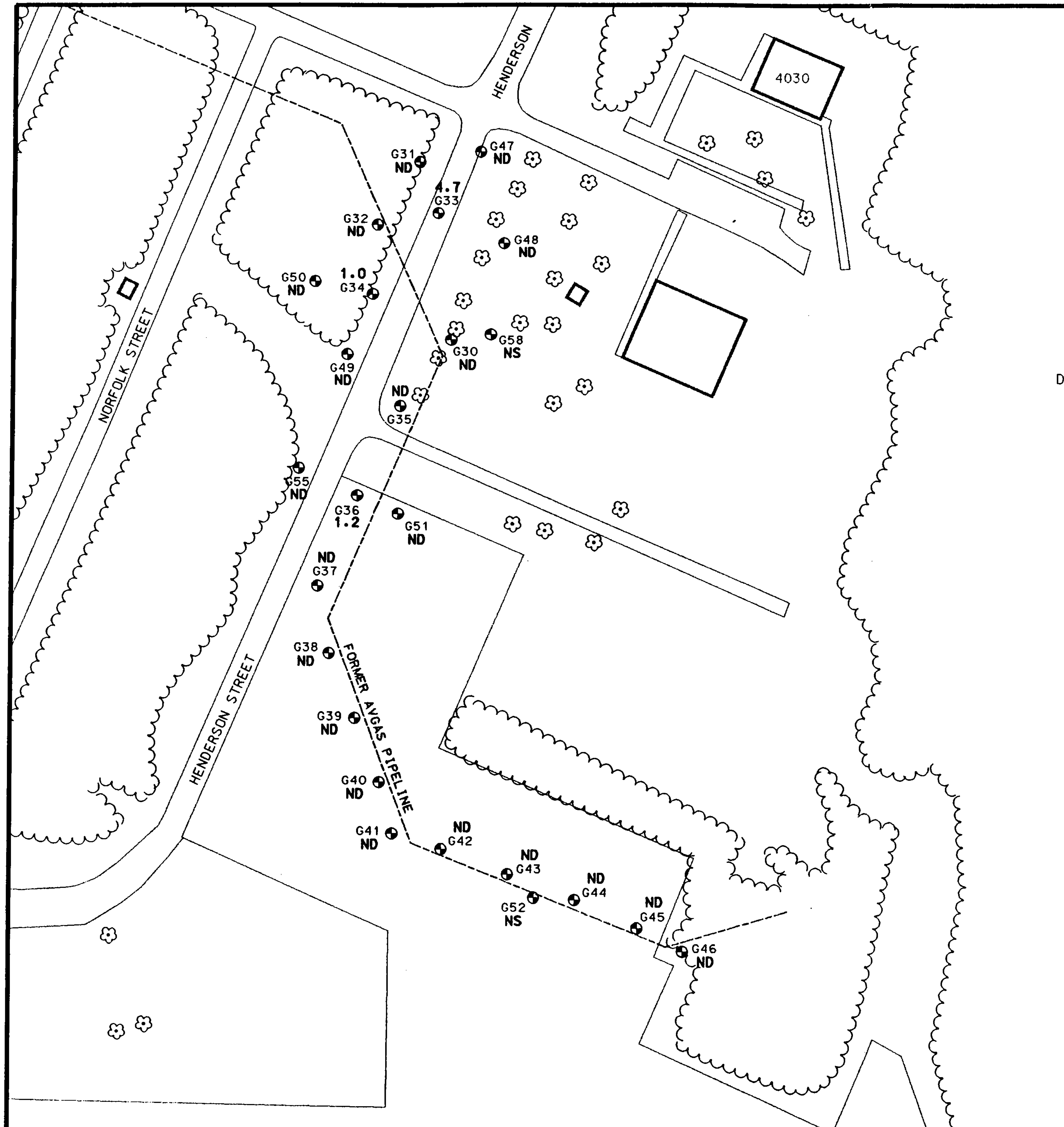
FIGURE 4-1

TITLE
TOTAL BTEX SOIL GAS SCREENING RESULTS
TRUCK FUEL DISPENSING STATION
CONTAMINANT ASSESSMENT REPORT
MCRD
PARRIS ISLAND
SOUTH CAROLINA

D473973

Rev. 0

03/12/97



LEGEND

GEOPROBE	
TREES	
SOIL GAS CONCENTRATION [1]	4.7
NONDETECT	ND
NOT SAMPLED FOR SOIL GAS	NS

1 - CONCENTRATION IN MICROGRAMS PER LITER OF VAPOR

NOTE:
DATA COLLECTED OCT. 28-31, 1996

-N-

80 0 80
SCALE IN FEET

FIGURE 4-2

Brown & Root Environmental
OAK RIDGE, TENNESSEE

TITLE
TOTAL BTEX SOIL GAS SCREENING RESULTS
HENDERSON STREET AREA
CONTAMINANT ASSESSMENT REPORT
MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B004.dgn | DATE 2-28-97

D473973

CTO 0018

shown in Figure 4-2. Field laboratory analytical sheets and associated chain of custody forms are provided in Appendix A. Three of the soil-gas samples contained detectable concentrations of total BTEX compounds ranging from 1.0 ug/l-v (G34) to 4.7 ug/l-v (G33). Two of the soil-gas samples (G33 and G34) were collected near the point where the former AVGAS pipeline crossed Henderson Street. The other soil-gas detection was at G36 adjacent to the AVGAS pipeline.

4.2 GROUNDWATER SCREENING INVESTIGATION

4.2.1 Truck Fuel Dispensing Station

Based on soil-gas results 13 locations were selected to collect groundwater samples for screening purposes. Figure 4-3 shows the 13 soil-gas sample locations where groundwater samples were collected and presents the screening results. Field laboratory analytical data sheets and associated chain of custody forms are provided in Appendix B. Groundwater was collected from the top of the aquifer at approximately 5 feet below the ground surface. Only G13 had detectable concentrations of BTEX compounds with benzene at 745 ug/l and xylene at 16.4 ug/l. The results of the soil-gas and groundwater screening along with proposed monitoring well locations were forwarded to SCDHEC on November 6, 1996. Approval for monitoring well installation was received on November 7, 1996, from SCDHEC.

4.2.2 Henderson Street Area

Ten locations were selected to collect groundwater samples for screening purposes based on soil gas screening results. Figure 4-4 shows the ten soil-gas sample locations where groundwater sample were collected and presents the screening results. Field laboratory analytical data sheets and associated chain of custody forms are provided in Appendix B. Groundwater was collected from the top of the aquifer at approximately 4 feet below the groundsurface along the former AVGAS pipeline. Two sample locations contained detectable concentrations of BETX. G37 had 10.3 ug/l of xylene and G41 had 11.1 ug/l of ethylbenzene in the groundwater. None of the samples contained detectable concentrations of benzene.

Based on the results of the soil-gas analysis and groundwater screening no additional monitoring wells were proposed for the Henderson Street Area.

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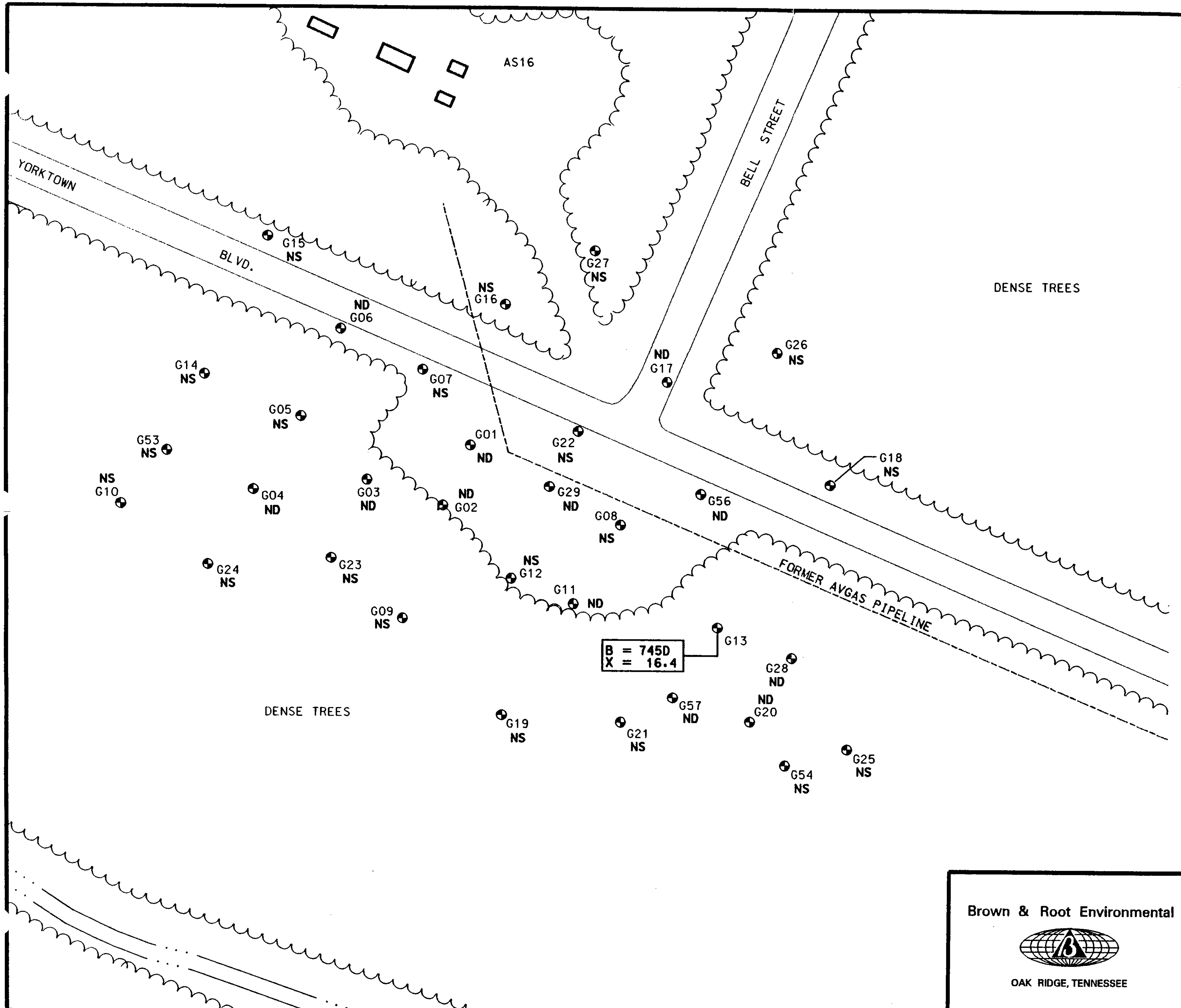
03/12/97



LEGEND

GEOPROBE	
TREES	

BTEX CONCENTRATIONS [1]

B = BENZENE
T = TOLUENE
E = ETHYLBENZENE
X = XYLENE

B =	745D
T =	3.0
E =	2.0
X =	16.4

INDIVIDUAL VALUE OBTAINED BY DILUTION	D
NONDETECT	ND
NOT SAMPLED FOR GROUNDWATER	NS

1 - CONCENTRATION IN MICROGRAMS PER LITER OF GROUNDWATER

NOTE:

DATA COLLECTED OCT. 31-NOV. 1,1996

-N-

60 0 60

SCALE IN FEET

FIGURE 4-3

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

GROUNDWATER SCREENING RESULTS
TRUCK FUEL DISPENSING STATION
CONTAMINANT ASSESSMENT REPORT

MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B007.dgn

DATE 2-28-97

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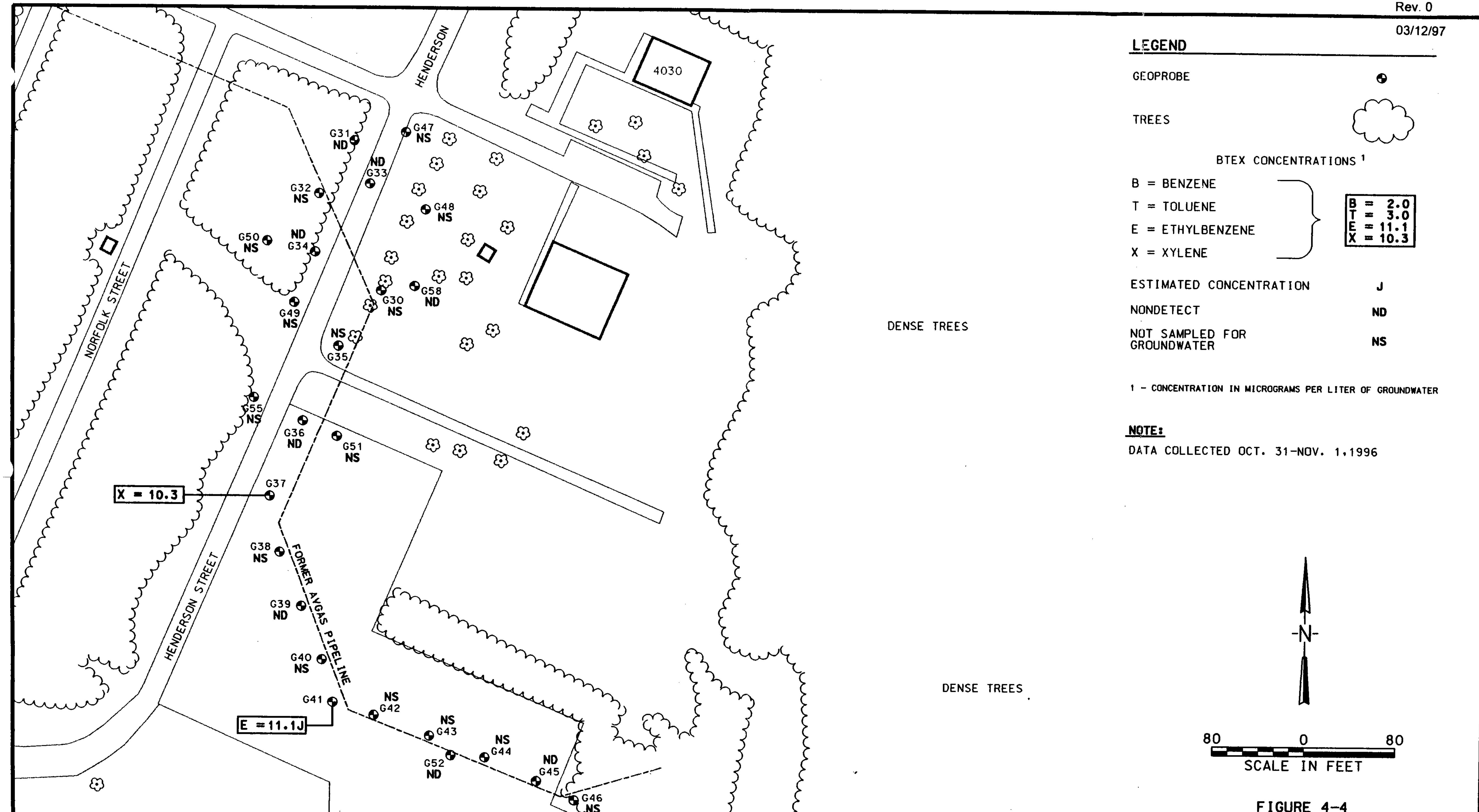

FIGURE 4-4

Brown & Root Environmental
OAK RIDGE, TENNESSEE

TITLE:
GROUNDWATER SCREENING RESULTS
HENDERSON STREET AREA
CONTAMINANT ASSESSMENT REPORT

MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B006.dgn
DATE 2-28-97

5.0 SOIL INVESTIGATION

The description of the site geology presented in this section is derived from the well borings installed in November 1996. Boring logs are provided in Appendix D. Figures 5-1 and 5-2 are cross-sections depicting the site geology (see Figure 1-3 for cross-section locations).

5.1 SITE GEOLOGY

The soils at the site consist of an upper silty, very fine-grained sand that is reddish- to yellowish-brown. This sand is approximately 6 ft thick and overlies another sand that is very fine-grained, light gray to whitish gray, and is approximately 8 ft thick. Underlying the light gray sand is a clayey, bluish-gray sand that is also very fine-grained and is approximately 4 ft thick. These sand intervals are underlain by an interbedded sand and clay interval that is approximately 4 ft thick. The interbedded sand is bluish-gray and the clay is dark olive gray. The lowermost interval sampled was a dark, olive-gray sandy clay encountered at approximately 24 bls.

5.2 SOIL ASSESSMENT

Well borings PAI-MW01 through PAI-MW06 were installed on November 12-13, 1996. Well boring locations were selected based on soil-gas and groundwater screening results obtained in October 1996 and with the approval of the SCDHEC. Well boring PAI-MW01, PAI-MW02, PAI-MW03, and PAI-MW06 locations were selected to determine the lateral extent of impacted soil and groundwater at the Truck Fuel Dispensing Station. PAI-MW05 was installed to help characterize the groundwater plume and to determine if impacted soil still remains along the former AVGAS pipeline near former soil sample PI16077 (see Figure 2-2). Monitoring well PAI-MW04 was installed to help determine the vertical extent of groundwater contamination at the PAI-AVGAS-1C location and to determine if impacted soil remains in the vicinity of former soil samples PI16043 and PI16082 (see Figure 2-2). Soil headspace readings were recorded for each split-spoon sample collected and are presented in Figures 5-1 and 5-2 and on the boring logs in Appendix D. One soil sample was collected from above the water table at each boring for laboratory analysis of BTEX, MTBE, GRO, naphthalene, and lead at General Engineering Laboratories (GEL). The water table was encountered at approximately 3 to 4 ft bls, therefore all soil samples collected for laboratory analysis were collected from the upper 3 ft of each boring.

Six soil samples and one duplicate were selected from the six borings and sent to GEL for analysis. Analytical results are summarized in Table 5-1 and laboratory analytical sheets for the subsurface soil

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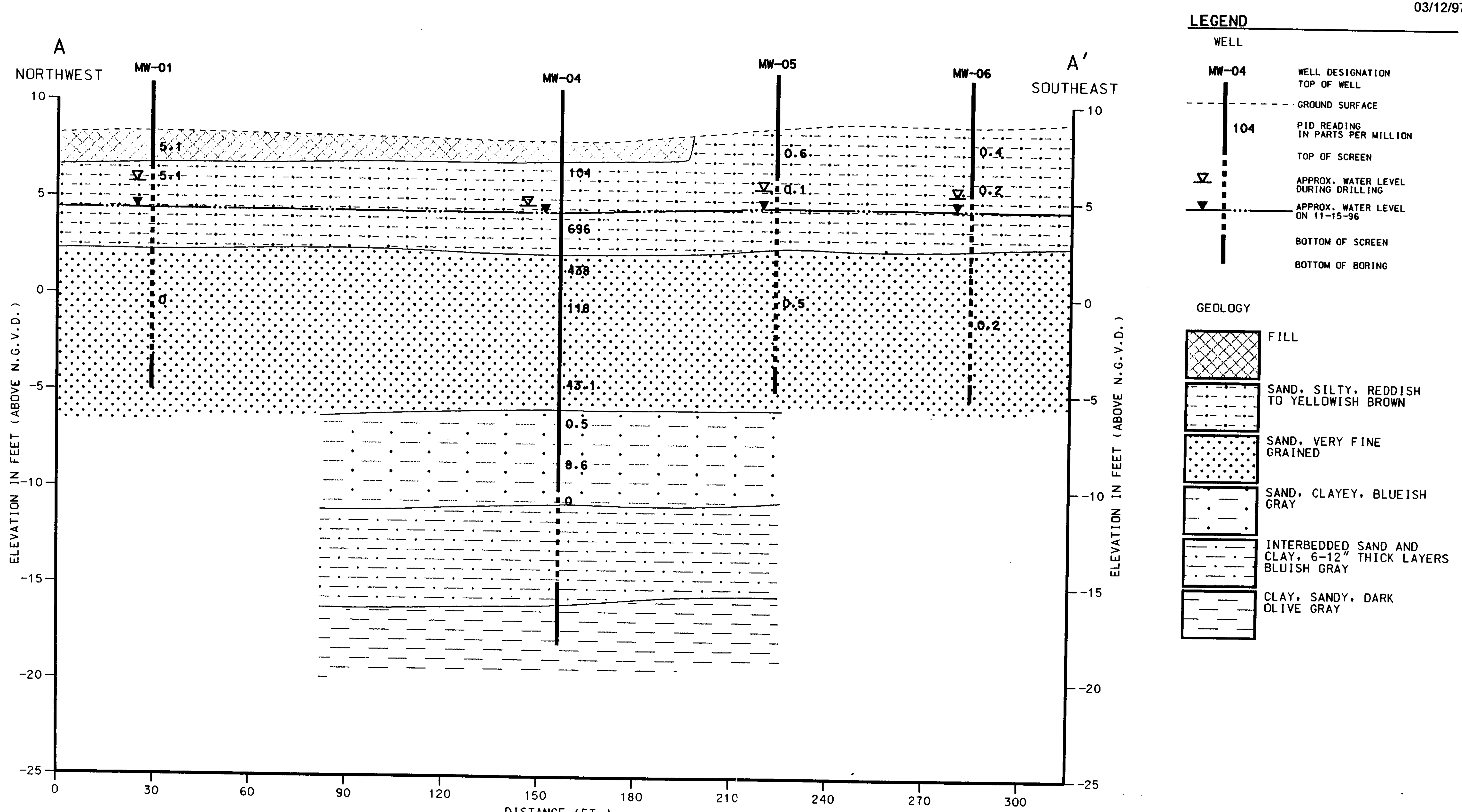


CROSS-SECTION A-A′

VERTICAL EXAGGERATION = 6 X HORIZONTAL

FIGURE 5-1

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

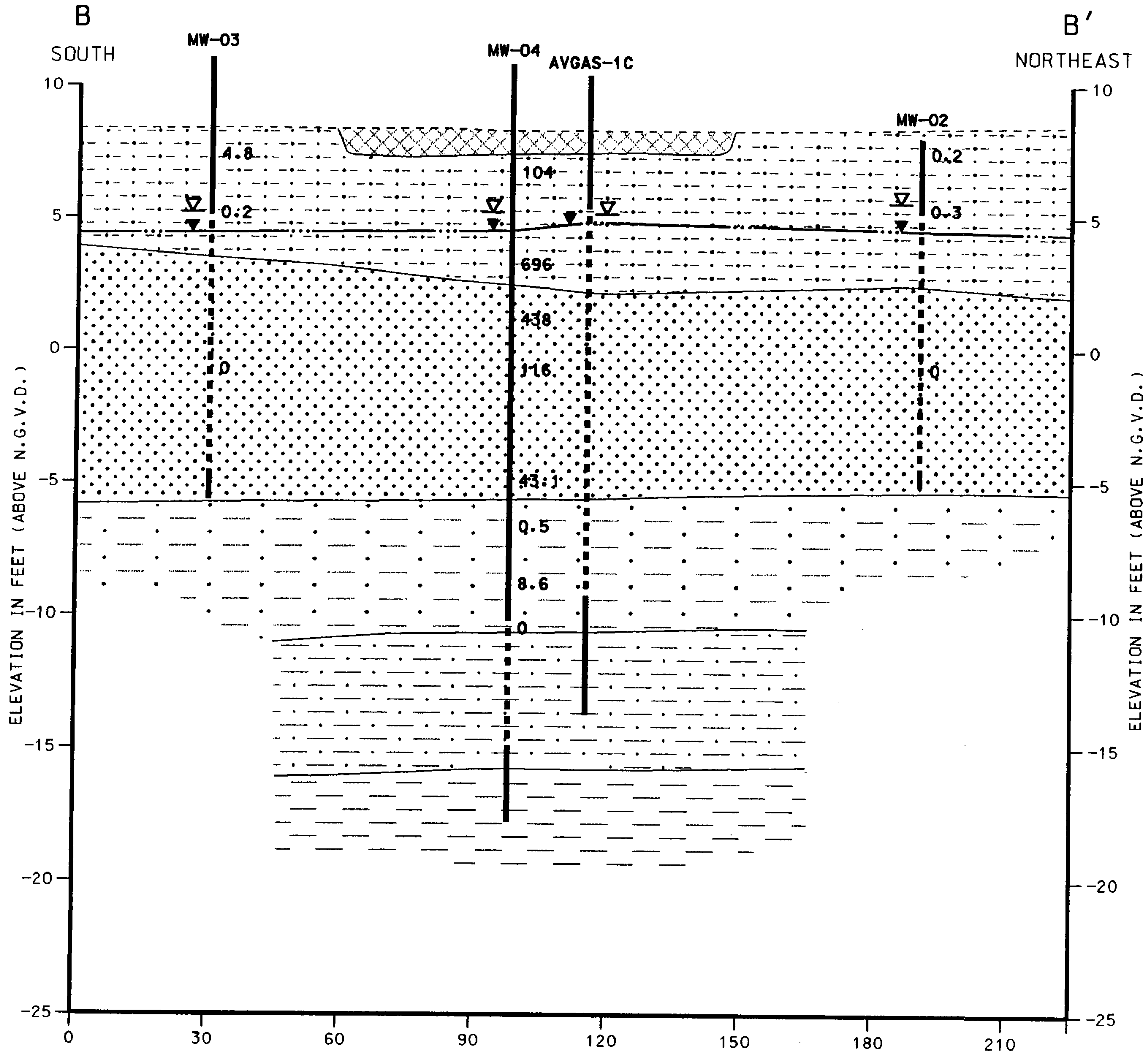
CROSS-SECTION A-A′
TRUCK FUEL DISPENSING STATION
CONTAMINANT ASSESSMENT REPORT

MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B009.dgn

DATE 3-13-97

D473973



CROSS-SECTION B-B'

VERTICAL EXAGGERATION = 6 X HORIZONTAL

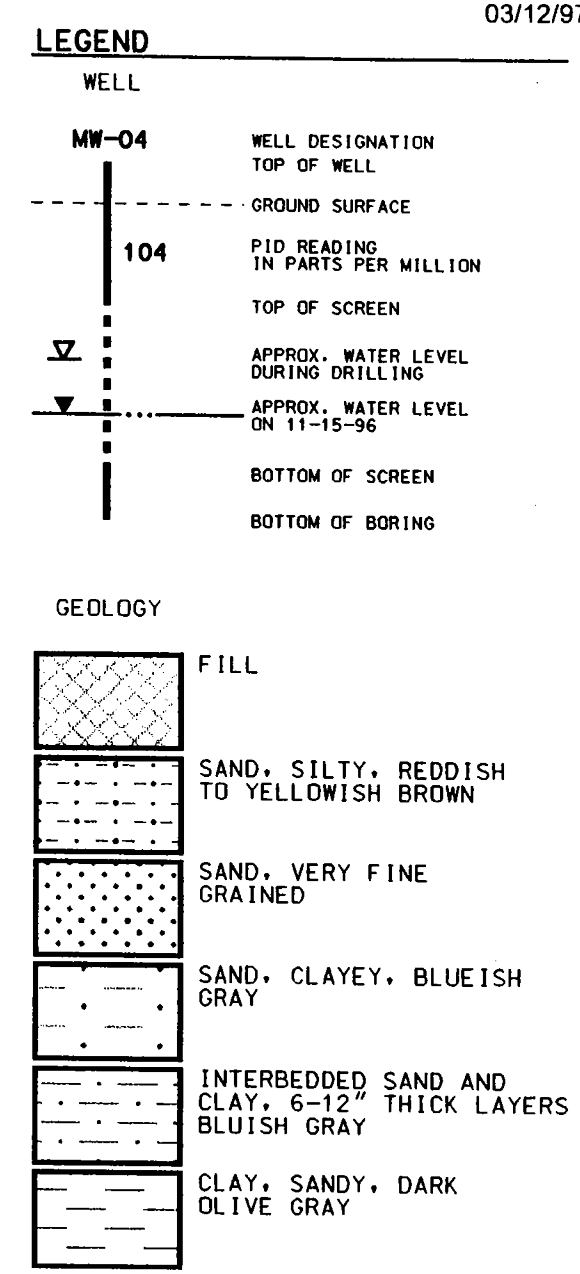


FIGURE 5-2

Brown & Root Environmental OAK RIDGE, TENNESSEE	TITLE CROSS-SECTION B-B' TRUCK FUEL DISPENSING STATION CONTAMINANT ASSESSMENT REPORT MCRD PARRIS ISLAND SOUTH CAROLINA
CAD FILE NO. 7387B010.dgn	DATE 3-13-97

TABLE 5-1

SOIL ANALYTICAL RESULTS
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE # 15495

SAMPLE IDENTIFICATION	DATE SAMPLED	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBENZENE (mg/kg)	XYLENE (mg/kg)	MTBE (mg/kg)	NAPHTHALENE (mg/kg)	GRO (mg/kg)	LEAD (mg/kg)
PAI-SU-MW01-01	11/12/96	0.0022U	0.0003J	0.00025J	0.0008J	0.0022U	0.0022U	0.0549U	3
PAI-SU-MW02-01	11/12/96	0.0023U	0.0023U	0.0023U	0.0045U	0.0023U	0.0023U	0.0568	8.4
PAI-SU-MW03-01	11/12/96	0.0023U	0.0023U	0.0023U	0.0045U	0.0023U	0.0023U	0.0568	6.2
PAI-SU-MW04-01	11/13/96	0.0023U	0.0023U	0.0023U	0.0046U	0.0023U	0.0023U	0.0047J	6.9
PAI-DP-MW04-01	11/13/96	0.0023U	0.0023U	0.0023U	0.0046U	0.0023U	0.0023U	0.0539J	7.4
PAI-SU-MW05-01	11/13/96	0.0023U	0.0023U	0.0023U	0.0046U	0.0023U	0.0012U	0.0581U	5.5
PAI-SU-MW06-02	11/12/96	0.0024U	0.0024U	0.0024U	0.0048U	0.0024U	0.0024U	0.0602U	6.6
PAI-DS-MW05 (Drum sample)	11/18/96	0.0018J	0.00044J	0.0032	0.0068	0.0026U	0.0026U	0.515	3
RBSL		0.007	1.7	1.5	44.0	NA	0.2	NA	NA

RBSL - Risk Based Screening Levels obtained from SCDHEC Guidance Document "Risk Based Corrective Action for Petroleum Releases", June 1995.
NS - Not Sampled.
U - Analytical result is a non-detect.
J - Numerical value is below the detection limit.
NA - Not applicable.

samples and associated quality control samples along with chain of custody forms are provided in Appendix E. The only BTEX compounds detected were toluene and xylene at 0.0003J mg/kg and 0.0008J mg/kg respectively from the soil sample at PAI-MW01 at a depth of one foot bls. GRO concentrations ranged from 0.0047J mg/kg at PAI-MW04 at one foot bls to 0.0568 mg/kg at PAI-MW02 and PAI-MW03 at one foot bls. Total lead concentrations in subsurface soils ranged from 3.0 mg/kg at PAI-MW01 to 8.4 mg/kg at PAI-MW02.

A soil sample (PAI-DS-MW05) was collected from the drummed soil cuttings from monitoring well PAI-MW05 for waste characterization purposes. PAI-MW05 was thought to have the highest petroleum hydrocarbon concentrations in groundwater based on groundwater screening data. Concentrations detected in the soil cuttings sample are presented in Table 5-1 and the laboratory data sheets are included in Appendix E.

One soil sample (PAI-SB-HA1-02) was collected using a hand auger on January 23, 1997 at the Truck Fuel Dispensing Station for analysis of grain-size and Total Organic Carbon (TOC) by Method 415.1. The sample was collected approximately 10 ft south of G11 at a depth of 2 ft bls. The TOC concentration was 2240 mg/kg and the grain-size analysis results indicated 81% sand, 5.2 % silt, and 13.8 % clay. Laboratory data sheets for soil samples are included in Appendix E.

The analytical results from the subsurface soils collected above the water table do not indicate any areas of impacted soil above SCDHEC RBSLs for sandy soils. These soil samples were collected from areas near previous sampling points (Rust E&I 1995) where impacted soil had been detected in 1995.

6.0 GROUNDWATER INVESTIGATION

6.1 AQUIFER CHARACTERISTICS

Monitoring wells PAI-MW01 through PAI-MW06 were installed by B&R Environmental in November 1996 at the Truck Fuel Dispensing Station to help determine the lateral and vertical extent of petroleum hydrocarbon contamination identified at monitoring well PAI-AVGAS-1C in April 1995. Monitoring well construction details are provided in Table 6-1 and Appendix D for the six wells installed in November 1996 and the two wells (PAI-AVGAS-1C and PAI-AVGAS-2C) installed in April 1995 by Bechtel. Groundwater at the site is encountered at approximately 4 ft bls. The monitoring wells installed in November (except for PAI-MW04, the vertical extent well) were screened from 2.0 ft to 3.2 ft bls at the top of the screen to 12 ft to 13.2 ft bls at the bottom of the screen. PAI-MW04 was screened from 18 ft bls down to the top of the confining clay at 23 ft bls.

Based on groundwater screening data and an estimated groundwater flow direction to the southeast, six monitoring well locations were selected to help define the extent of groundwater contamination at the site. Groundwater elevations recorded in November 1996 and January 1997 are presented in Table 6-2. Figures 6-1 and 6-2 show the potentiometric surface of the groundwater on November 15, 1996 and January 23, 1997 respectively. Groundwater flow at the site is to the south and southwest. The hydraulic gradients at the site measured between wells PAI-MW03 and PAI-MW05 was 0.003 and from PAI-AVGAS-1C to PAI-MW03 was 0.005. An average hydraulic gradient of 0.004 was used for aquifer calculations.

Rising-head slug tests were performed on each of the newly installed wells in November 1996. An InSitu data logger and transducer were used to measure and record drawdown and recharge data. The slug-test data were evaluated by the Bouwer-Rice method using the AQTESOLV program. Hydraulic conductivity estimates from the five shallow well tests ranged from 3.03×10^{-3} cm/sec at PAI-MW05 to 4.66×10^{-3} cm/sec at PAI-MW01. The hydraulic conductivity at PAI-MW04, the deep well, was 1.46×10^{-4} cm/sec. Slug-test data and calculations are presented in Appendix G. Using an average hydraulic conductivity of 3.76×10^{-3} cm/sec for the shallow wells, a hydraulic gradient of 0.004, and an estimated effective porosity of 0.25, a seepage velocity of 61.3 ft/yr was calculated for the surficial aquifer at the site.

TABLE 6-1

MONITORING WELL CONSTRUCTION DETAILS
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE # 15495

Well Number.	Total Depth (ft. BLS)	Top of Screen (ft BLS)	Bottom of Screen (ft BLS)	Top of Sand Pack (ft BLS)	Top of Bentonite Seal (ft BLS)	Top of Casing (ft ALS)
PAI-MW01	12.5	2.0	12.0	1.5	0.5	2.5
PAI-MW02	13.3	2.8	12.8	1.5	0.5	-0.2
PAI-MW03	13.5	3.0	13.0	1.5	0.5	2.59
PAI-MW04	23.5	18.0	23.0	16.0	14.0	2.68
PAI-MW05	12.6	2.1	12.1	1.5	0.5	2.51
PAI-MW06	13.7	3.2	13.2	1.5	0.5	2.55
PAI-AVGAS-1C	19.5	2.5	17.5	2.0	1.0	3.50
PAI-AVGAS-2C	19.5	2.5	17.5	2.0	1.0	4.00

Notes:

BLS - Below Land Surface

ALS - Above Land Surface

TABLE 6-2

**GROUNDWATER ELEVATIONS
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE # 15495**

Well #	Total Depth of Well (ft)	Top of Casing Elevation (MSL)	Date Measured	Depth to Water (BTOC)	Groundwater Elevation (MSL)
MW-1	12.8	11.11	11/14/96	6.55	4.56
			11/15/96	6.58	4.53
			11/16/96	6.61	4.50
			11/17/96	6.66	4.45
			11/17/96	6.63	4.48
			1/23/97	5.51	5.60
MW-2	13.1	8.04	11/14/96	4.73	3.31
			11/15/96	3.48	4.56
			11/16/96	3.45	4.59
			11/17/96	3.48	4.56
			11/17/96	3.45	4.59
			1/23/97	2.26	5.78
MW-3	13.4	11.00	11/14/96	6.45	4.55
			11/15/96	6.56	4.44
			11/16/96	6.51	4.49
			11/17/96	6.56	4.44
			11/17/96	6.51	4.49
			1/23/97	5.31	5.69
MW-4	12.5	10.78	11/14/96	NM	NM
			11/15/96	6.35	4.43
			11/16/96	NM	NM
			11/17/96	6.42	4.36
			11/17/96	6.40	4.38
			1/23/97	5.31	5.47
MW-5	12.5	11.65	11/14/96	6.95	4.70
			11/15/96	7.08	4.57
			11/16/96	7.03	4.62
			11/17/96	7.08	4.57
			11/17/96	7.03	4.62
			1/23/97	5.77	5.88
MW-6	13.5	11.46	11/14/96	6.75	4.71
			11/15/96	6.85	4.61
			11/16/96	6.85	4.61
			11/17/96	6.88	4.58
			11/17/96	6.86	4.60
			1/23/97	5.64	5.82
PAI-AVGAS-1C	15.0	10.4	11/14/96	NM	NM
			11/15/96	5.51	4.89
			11/16/96	5.41	4.99
			11/17/96	5.53	4.87
			11/17/96	6.47	3.93
			1/23/97	4.32	6.08
PAI-AVGAS-2C	15.0	12.18	11/14/96	NM	NM
			11/15/96	7.05	5.13
			11/16/96	7.03	5.15
			11/17/96	7.07	5.11
			11/17/96	7.17	5.01
			1/23/97	6.09	6.09

Notes:
MSL - Mean Sea Level
BTOC - Below Top of Casing
MN - Not Measured

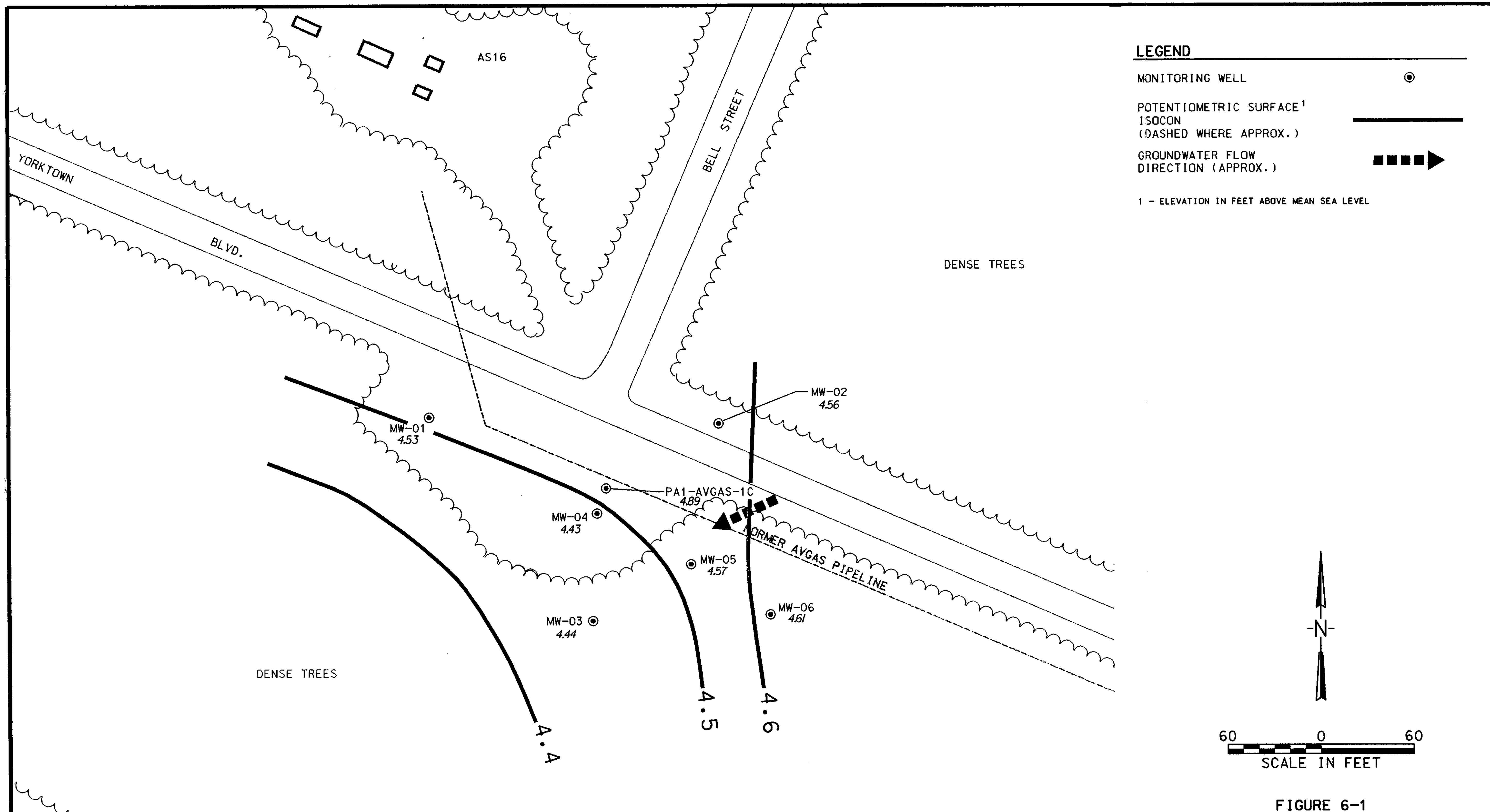


FIGURE 6-1

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

POTENTIOMETRIC SURFACE MAP
ON NOVEMBER 15, 1996
TRUCK FUEL DISPENSING STATION
CONTAMINANT ASSESSMENT REPORT
MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B012.dgn

DATE 4-28-97

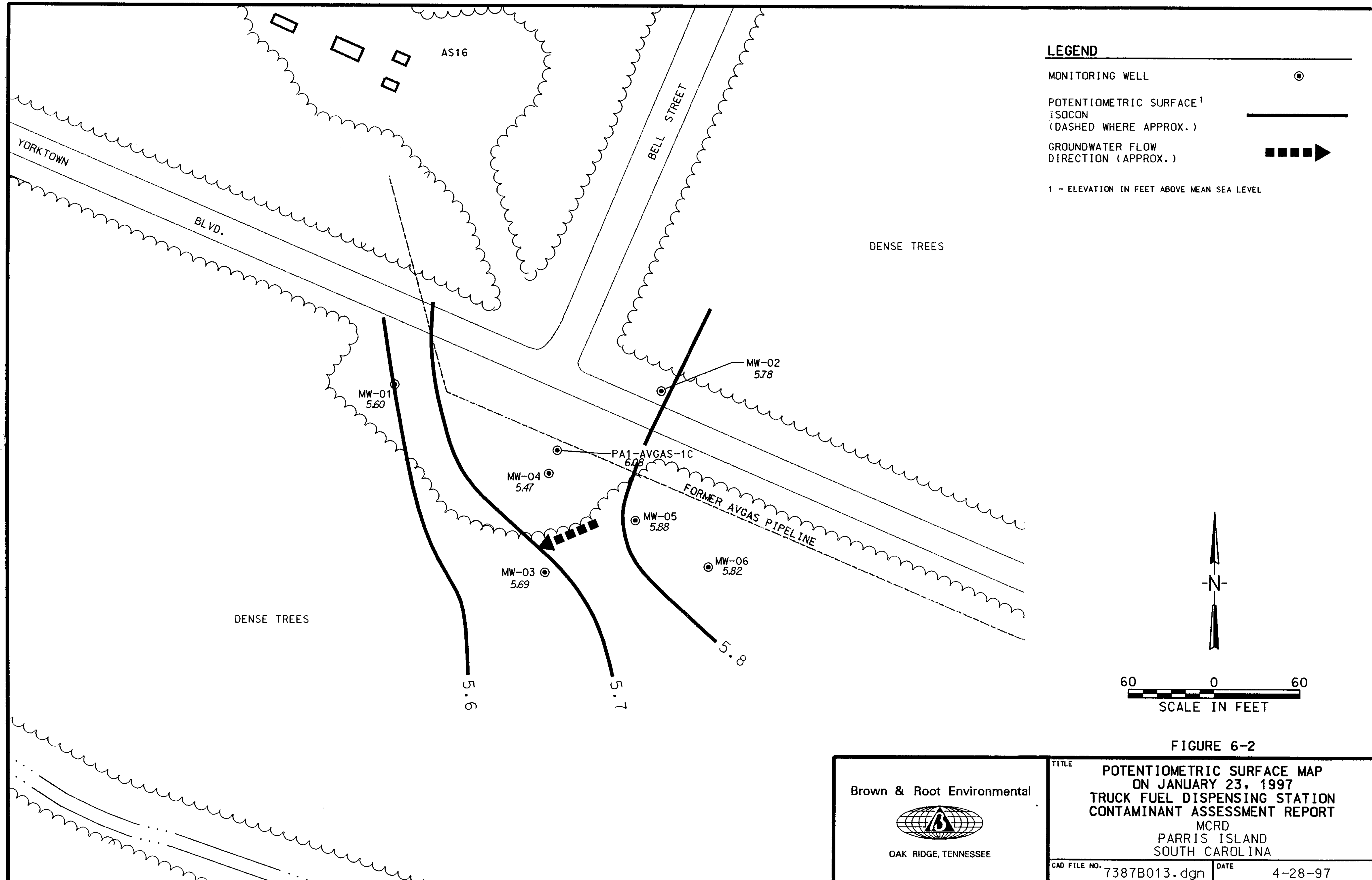


FIGURE 6-2

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

POTENTIOMETRIC SURFACE MAP
ON JANUARY 23, 1997
TRUCK FUEL DISPENSING STATION
CONTAMINANT ASSESSMENT REPORT
MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B013.dgn

DATE 4-28-97

6.2 GROUNDWATER ASSESSMENT

All of the new and existing monitoring wells were sampled on November 17, 1996. Groundwater samples were collected using a dedicated teflon bailer for each well. The samples were shipped overnight to GEL for analysis of BTEX, MTBE, GRO, lead, and naphthalene. A summary of groundwater analytical results is provided in Table 6-3 and laboratory data sheets along with associated quality control samples and chain of custody forms are provided in Appendix F.

No free product was encountered during the November 1996 sampling activities or during the groundwater level measurements in January 1997. Table 6-3 provides the results of groundwater sampling in November 1996 as well as results of the April 1995 sampling event at wells PAI-AVGAS-1C and PAI-AVGAS-2C for comparison. The only contaminant detected in groundwater from the Henderson Street Area well (PAI-MW2C) was GRO at 4.8J ug/l. Figure 6-3 shows the detected concentrations of BTEX and lead at the Truck Fuel Dispensing Station.

Benzene concentrations in groundwater ranged from <2.0 ug/l at PAI-MW01, PAI-MW02, PAI-MW06, and PAI-MW2C to 1840 ug/l at PAI-MW03. Benzene in groundwater exceeded the RBSL of 5.0 ug/l at wells PAI-MW03 (1840 ug/l), PAI-MW04 (179 ug/l), PAI-MW05 (1750 ug/l), and PAI-MW1C (470 ug/l). Toluene concentrations in groundwater ranged from 0.38J ug/l at PAI-MW01 to 1570 ug/l at PAI-MW05 which was the only well to exceed the RBSL for toluene of 1000 ug/l. Ethylbenzene concentrations in groundwater ranged from <2.0 ug/l at PAI-MW01, PAI-MW02, PAI-MW06, and PAI-MW2C to 1980 ug/l at PAI-MW05 and exceeded the RBSL for ethylbenzene of 700 ug/l at PAI-MW04 (850 ug/l), PAI-MW05 (1980 ug/l), and PAI-MW1C (760 ug/l). Xylene concentrations ranged from <4.0 ug/l at PAI-MW01, PAI-MW02, PAI-MW06, and PAI-MW2C to 3640 ug/l at PAI-MW05. There were no xylene concentrations detected that exceeded the RBSL for xylene of 10,000 ug/l.

MTBE was not detected in any of the groundwater samples, however, detection limits were elevated up to 100 ug/l due to samples being diluted at wells PAI-MW03, PAI-MW04, PAI-MW05, and PAI-AVGAS-1C. The four remaining groundwater samples from the November 1996 sampling event were not diluted and did not contain MTBE above the detection limit of 2.0 ug/l. MTBE at the site is not thought to be a potential contaminant since the widespread use of MTBE in gasoline fuels did not begin until the 1980s and the AVGAS pipeline reportedly has not been in service since the late 1940s or 1950s.

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TABLE 6-3

GROUNDWATER ANALYTICAL RESULTS
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE # 15495

SAMPLE IDENTIFICATION	DATE SAMPLED	BENZENE (µg/l)	TOLUENE (µg/l)	ETHYLBENZENE (µg/l)	XYLENE (µg/l)	MTBE (mg/l)	NAPHTHALENE (µg/l)	GRO (µg/l)	LEAD (µg/l)	TPH (µg/l)
PAI-GW-MW01-01	11/17/96	2U	0.52J	2U	4U	2U	10U	50U	1.6U	NS
PAI-GW-MW02-01	11/17/96	2U	0.38J	2U	4U	2U	10U	50U	4.8B	NS
PAI-GW-MW03-01	11/17/96	1840D	13.3JD	191D	73.2JD	100UD	10U	11,700D	2.0B	NS
PAI-GW-MW04-01	11/17/96	179D	659D	850D	1140D	100UD	10U	10,200D	11.1	NS
PAI-GW-MW05-01	11/17/96	1750D	1570D	1980D	3640D	D	10U	44,800D	258.0	NS
PAI-GW-MW06-01	11/17/96	2U	2U	2U	4U	2U	10U	50U	11.9	NS
PAI-AVGAS-1C	4/14/95	2250D	2630D	3650D	9500D	5000UD	NS	NS	NS	52,200D
PAI-GW-MW1C-01	11/17/96	470D	909D	760D	1360D	100UD	10U	16,600D	39.3	NS
PAI-DP-MW1C*	11/17/96	496D	986D	840D	1500D	100UD	10U	14,200D	71.8	NS
PAI-AVGAS-2C	4/14/95	3.0	2.9	7.7	17.8	50U	NS	NS	11.0	148.00
PAI-GW-MW2C-01	11/17/96	2U	2U	2U	4U	2U	10U	4.8J	1.6U	NS
RBSL		5	1000	700.0	10,000	40	25		15	

NOTES:
RBSL - Risk Based Screening Levels from SCDHEC Guidance Document "Risk Based Corrective Action Petroleum Releases", June 1995.
Shaded concentrations exceed RBSL.
* - Duplicate sample.
D - Sample diluted.
U - Analytical result is a non-detect.
J - Estimated concentration.
B- Reported value is above detection limit and below reporting limit.
NS - Not Sampled.

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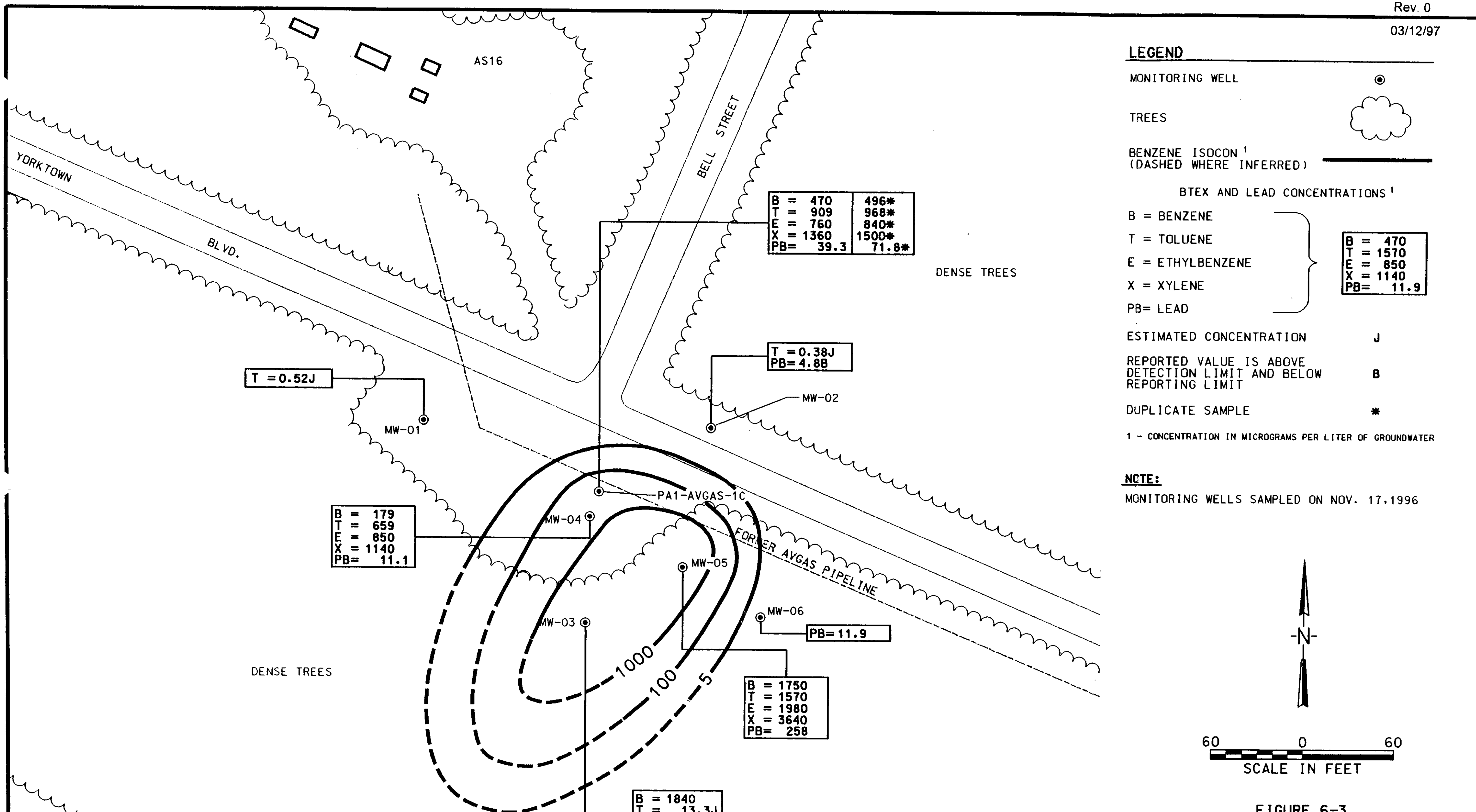

FIGURE 6-3

Brown & Root Environmental

OAK RIDGE, TENNESSEE

TITLE

BTEX AND LEAD DETECTIONS IN GROUNDWATER
TRUCK FUEL DISPENSING STATION
CONTAMINANT ASSESSMENT REPORT
MCRD
PARRIS ISLAND
SOUTH CAROLINA

CAD FILE NO. 7387B008.dgn | DATE 3-17-97

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Naphthalene was not detected in groundwater above the detection limit of 10 ug/l. GRO detections ranged from 4.8J ug/l at PAI-MW2C to 44,800 ug/l at PAI-MW05 (Table 6-3). Lead in groundwater ranged from <1.6 ug/l at PAI-MW01 and PAI-MW2C to 258 ug/l at PAI-MW05. Lead concentrations exceeded the groundwater RBSL of 15 ug/l for lead at PAI-MW05 (258 ug/l) and PAI-MW1C (39.3 ug/l).

The areal extent of impacted groundwater at the Truck Fuel Dispensing Station is conservatively illustrated in Figure 6-3. The plume is approximately 150 ft wide and approximately 200 ft long although the extent in the downgradient direction is estimated. The lateral extent of contamination has been defined to the northwest with PAI-MW01, to the north with PAI-MW02, and to the southeast with PAI-MW06. Monitoring well PAI-MW05 had the highest total BTEX concentrations in groundwater with well PAI-MW03 having the highest benzene concentration in groundwater. The vertical extent well (PAI-MW04) which was installed to the top of the confining clay at a depth of 23 ft bls contained benzene (179 ug/l) and ethylbenzene (850 ug/l) above groundwater RBSLs.

Groundwater at the Truck Fuel Dispensing Station has been impacted by a release of aviation gasoline from spillage associated with fuel unloading activities and/or leaks over time from the AVGAS pipeline. Based on groundwater screening results and groundwater sampling in November 1996 the impacted groundwater appears to be limited to a relatively small area. On January 15, 1997, SCDHEC was contacted for guidance as to the need for additional monitoring wells to define the extent of groundwater contamination at the site. The response from SCDHEC was that no additional monitoring wells were warranted based on analytical results and a subsequent interpretation that a reasonable delineation of the contaminant plume had been developed.

Groundwater screening results and groundwater sampling of well PAI-AVGAS-2C at the Henderson Street Area did not indicate any petroleum hydrocarbon concentrations above RBSLs.

7.0 RISK ASSESSMENT

7.1 RECEPTOR SURVEY RESULTS

A receptor survey was conducted by B&R Environmental in November, 1996. The survey included a review of topographic maps, a tour of the site, and interviews with MCRD Parris Island officials. A summary of the information obtained is presented below.

Potable Water

The potable water for MCRD Parris Island is not obtained from base water wells. MCRD Parris Island officials confirmed that Parris Island is supplied by the Beaufort-Jasper Water and Sewer Authority. Two former drinking water wells were identified on the island, however, these two wells are no longer in use. These two wells are located some distance from the site of hydrocarbon impact: one well is 6500 ft cross-gradient, and the other is 10,000 ft upgradient. Because of these spatial relationships and the availability of off-base potable water, the on-base drinking water wells were not evaluated as potential receptor pathways.

Residential Areas

The site of concern is located along Yorktown Boulevard. This area is approximately 3,700 ft cross-gradient (hydraulically) from the nearest military housing area. Because of this distance, residents were not considered potential receptors.

Utilities

Underground utilities include an 8 inch water line that parallels Yorktown Boulevard at a depth of 2.5 ft. Groundwater levels have been measured at a depth of 3.7 to 4.3 ft. below the ground surface. Because the utility is located above the water line, it was not evaluated as a potential exposure pathway. A map showing utility routes is included in Figures 1-3 and 1-4.

Surface water

A marsh area lies 1,700 ft downgradient or the area of concern, and was evaluated as a potential exposure pathway.

7.2 CONTAMINANTS OF CONCERN IN SOIL AND GROUNDWATER

Soil

Soil remediation was performed by Bechtel in March 1995. After contaminated soil was excavated, soil samples were collected from the trench walls and bottom. Soil samples confirmed that some BTEX concentrations were detected, however the most recent soil samples collected in November 1996 were below Tier 1 levels. Groundwater samples were collected following the installation of monitoring wells PAI-AVGAS-1C and PAI-AVGAS-2C.

Groundwater

The latest round of groundwater sampling performed in November, 1996, indicates that the contaminants of concern (COCs) in groundwater above RBSLs are benzene, toluene, and ethylbenzene. Lead is also a COC in groundwater because concentrations exceed the Maximum Concentration Limit (MCL).

7.3 FATE AND TRANSPORT MODEL DESCRIPTION

The fate and transport model used for the prediction of plume migration of benzene, toluene, and ethylbenzene was the *Bioscreen Natural Attenuation Decision Support System*, that is published by the Technology Transfer Division of the Air Force Center for Environmental Excellence, June 1996. A copy of the fate and transport modeling outputs are included in Appendix H.
Site specific data was used wherever possible in the Bioscreen model. Where site specific data was not available, a conservative value protective of human health and the environment was used. Input parameters used for the Bioscreen model were the following:

Hydraulic Gradient - A hydraulic gradient of 0.004 ft/ft was calculated using water level measurements collected on site on November 15, 1996. Calculations are included in Appendix G.

Hydraulic Conductivity - Six slug tests were performed on site in November 1996 from five wells screened in the surficial aquifer from 2 to 12 feet bls and one well screened from 18 to 23 bls. Hydraulic conductivities from the five shallow wells were calculated using the AQTESOLV program and ranged from 0.003 to 0.0047 cm/sec. An average hydraulic conductivity of 0.0037 cm/sec was used as the input parameter. Calculations are included in Appendix G.

Porosity : Porosity for the sandy soil on the site was estimated to be 25%. This estimate was based on porosities of similar soils in the area.

Estimated Plume Length and Width - A plume length of approximately 200 feet was estimated by measuring the distance from monitoring well PAI-AVGAS-1C to the estimated downgradient extent of impacted groundwater on Figure 6-3. A plume width of 150 ft. was estimated by selecting two points on the outside of the plume that were halfway between monitoring wells where the last measurable concentrations occurred and the areas where hydrocarbon impact was not detected (see Figure 6-3).

Soil Bulk Density was estimated to be 1.58 kg/l based on table 10.2 "Natural Bulk Densities of Typical Soils and Rocks" in The Practical Handbook of Groundwater Monitoring (Neilsen, 1991)

Partition Coefficient - Table x2.7, "Chemical Specific Properties Used in the Derivation Example" from the ASTM standard lists partition coefficients for benzene, toluene, and ethylbenzene (ASTM E-1739-95, 1995). These values were used in the Bioscreen Model.

Fraction Organic Carbon - A soil sample collected on January 23, 1997, from PAI-SB-HA1-02 was analyzed for total organic carbon. The analytical result of 2240 mg/kg is provided in Appendix E. To convert this result into the fraction organic carbon present, 2240 was divided by 1,000,000 (number of milligrams in a kilogram), with the result .00224. The fraction organic carbon used for the model was 0.002.

Solute Half Life - The conservative values used for solute half life were obtained from The Handbook of Environmental Degradation Rates (Howard, 1991). In each case, the most conservative (anaerobic) value was used for benzene, toluene, and ethylbenzene.

Modeled Area Length and Width - A distance of 1700 ft was used as the length which is the distance from the site to the downgradient marsh area. A modeling width of up to 500 ft was used to allow for dispersion from the current plume width estimate of 150 ft.

Simulation Time - Using the groundwater seepage velocity calculated by Bioscreen, contaminants would be expected to travel approximately 61 ft per year. At this rate, it would take 27 years for the constituents to travel to the marsh if no retardation occurred. Therefore, a 50 year simulation time was used in order to allow the model to reach steady state .

Source Thickness in Saturated Zone - Source Thickness was set at 20 ft based on the thickness of the aquifer from the water table to the clay encountered at 24 bls which is thought to be the Hawthorn Formation.

Source Concentrations - The maximum detected value of benzene (1.84 mg/l at MW-3) was input into the model as the centerline of the plume. The 1.75 mg/l value at MW-5 was used for the concentration value at 30 ft from the plume centerline. At 60 ft from the plume centerline, a value of 0.179 mg/l (from MW-4) was used.

The maximum detected value of ethylbenzene (1.98 mg/l at MW-5) was used as the value for the plume centerline concentration. The values for the 30 ft and 60 ft intervals were input at 10% of the previous value: 0.198 mg/l and 0.0198 mg/l respectively.

The plume centerline value used for toluene was 1.57 mg/l from MW-5, which was the maximum concentration detected. At 30 ft from the centerline the value of 0.659 mg/l from MW-4 was used. At 60 ft from the plume's centerline, a value of 0.066 mg/l was used, that is 10% of the previous value.

Infinite Source - Since the original mass of hydrocarbons released is unknown, an infinite source was selected in order to be conservative.

In order to predict the migration of lead towards the marsh, a steady state attenuation calculation from the ASTM Standard table X3.1 was used. A copy of this calculation is shown in appendix H. (ASTM, E-1739-95, 1995).

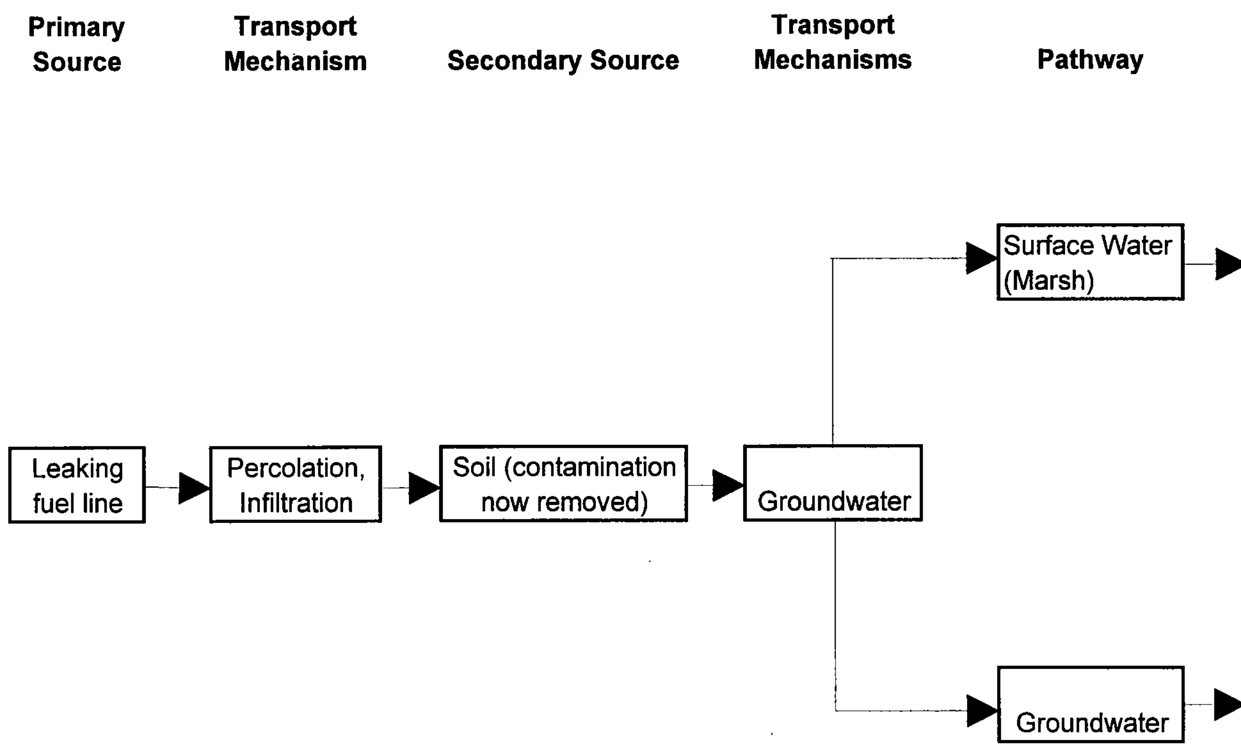
7.4 EXPOSURE PATHWAY ANALYSIS

Since much of the impacted soil at the site has been removed, contact with either groundwater or surface water that has been impacted by the contaminant plume are the only routes of exposure. A conceptual site model is presented in Figure 7-1. Table 7-1 lists pathway evaluations for all current land use scenarios. Table 7-2 lists pathway evaluations for future land use scenarios. A description of the potential receptors for both current and future scenarios is presented below.

Off site residents

The nearest residential area for military personnel is 3,700 ft from the area of concern (cross-gradient). Off-base potable water is available to all residents and is expected to remain so in the future. Therefore, no exposure pathways were evaluated for this receptor.

FIGURE 7-1
Conceptual Site Model
AVGAS Pipeline, Page Field
MCRD Parris Island, South Carolina
GWPD Site #15495



Surface Water (Marsh) pathway:

Exposure Route	Human Receptors: Site Worker	Off site visitor	Off-site Resident
Ingestion		○	
Inhalation	○	○	
Dermal Contact	○	○	
Food Chain		○	

Groundwater pathway:

Exposure Route	Human Receptors: Site Worker	Off site visitor	Off-site Resident
Ingestion			
Inhalation	○		
Dermal Contact	○		
Food Chain			

● Pathway complete

○ Pathway potentially complete

TABLE 7-1

CURRENT LAND USE
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE #15459

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Non-Selection
Off-site resident	Ingestion of groundwater from impacted water well	No	City water is available to off site residents.
	Direct contact with surface soil	No	Off-site soil is uncontaminated.
	Inhalation while showering	No	Residents do not use groundwater for showering
	Dermal contact while showering	No	Residents do not use groundwater for showering
	Inhalation of volatiles	No	Since the contaminated soil has been remediated, volatile emissions were not evaluated
On-site Resident	Ingestion of groundwater	No	No residents on-site
	Direct contact with surface soil	No	No residents on-site
	Inhalation while showering	No	No residents on-site
	Dermal contact while showering	No	No residents on-site
	Inhalation of volatiles	No	No residents on-site
Worker	Ingestion of groundwater	No	Controlled access, no workers on site.
	Direct contact with surface soil	No	No soil contamination on site.
	Inhalation while showering	No	N/A
	Dermal contact while showering	No	N/A
	Inhalation of volatiles	No	Controlled access, no workers on site
Visitor	Ingestion of groundwater	No	No water well located on site
	Direct contact with surface soil	No	Surface soil is not impacted
	Inhalation while showering	No	N/A
	Dermal contact while showering	No	N/A
	Inhalation of volatiles	No	Since the contaminated soil has been remediated, volatile emissions were not evaluated

TABLE 7-2

FUTURE LAND USE
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE #15459

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Non-Selection
Off-site Resident	Ingestion of groundwater from impacted water well	No	City water is available to all residents, and is expected to remain so in the future.
	Direct contact with surface soil	No	Off-site soil is uncontaminated.
	Inhalation while showering	No	City water is available to all residents, and is expected to remain so in the future.
	Dermal contact while showering	No	City water is available to all residents, and is expected to remain so in the future.
	Inhalation of volatiles	No	Since the contaminated soil has been remediated, volatile emissions were not evaluated
On-site Resident	Ingestion of groundwater	No	No residents on-site: the area of impact is in a controlled military area and is reasonably anticipated to remain so.
	Direct contact with surface soil	No	No residents on-site: the area of impact is in a controlled military area and is reasonably anticipated to remain so.
	Inhalation while showering	No	No residents on-site: the area of impact is in a controlled military area and is reasonably anticipated to remain so.
	Dermal contact while showering	No	No residents on-site: the area of impact is in a controlled military area and is reasonably anticipated to remain so.
	Inhalation of volatiles	No	No residents on-site: the area of impact is in a controlled military area and is reasonably anticipated to remain so.
Worker	Ingestion of groundwater	No	No water well located on site
	Direct contact with surface soil	No	Surface soil is not impacted
	Inhalation while showering	No	N/A
	Dermal contact with groundwater.	Yes	A future worker could be exposed to groundwater in a trench 3-4 ft. deep.
	Dermal contact with surface water.	Yes	A future worker could be exposed to the marsh area 1700 ft. from the site.
	Dermal contact while showering	No	N/A
	Inhalation of volatiles	No	Since the contaminated soil has been remediated, volatile emissions were not evaluated

TABLE 7-2

FUTURE LAND USE
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE #15459
PAGE TWO

Potentially Exposed Population	Exposure Route, Medium, and Exposure Point	Pathway Selected for Evaluation?	Reason for Selection or Non-Selection
Visitor	Ingestion of groundwater	No	No water well located on site
	Direct contact with surface soil	No	Surface soil is not impacted
	Inhalation while showering	No	N/A
	Dermal contact with surface water.	Yes	A future visitor could be exposed to the marsh area 1700 ft. from the site.
	Dermal contact while showering	No	N/A
	Inhalation of volatiles	No	Since the contaminated soil has been remediated, volatile emissions were not evaluated

On-site residents

There are no on-site residents. Future residents are also highly unlikely, because the site is on an island designated for military training. No future residential areas are planned for the area of hydrocarbon impact, therefore, no exposure pathway for this receptor was evaluated.

Workers

There are no workers currently in the area of hydrocarbon impact and the site has controlled access. A future site worker could be exposed to contaminated groundwater if a shallow trench reaching groundwater was created, therefore, this pathway was evaluated. Future workers were also evaluated for potential exposure to concentrations at the marsh area 1700 ft. downgradient from the area of hydrocarbon impacted groundwater.

Visitor

Visitors to the site are unlikely to be exposed to contaminated groundwater. Impacted soil along the former AVGAS pipeline has been removed, therefore this exposure pathway is not complete and was not evaluated. Future visitors were evaluated, however, for potential exposure to concentrations at the marsh area 1700 ft. downgradient from the area of hydrocarbon impacted groundwater.

7.5 EXPOSURE CALCULATIONS

There are no exposure pathways currently complete for this site. However, the following future scenarios were evaluated:

Surface Water Receptors

Groundwater flow towards the marsh area and possible future receptors are off-site workers and visitors. The nearest potential downgradient groundwater discharge is a marsh area 1700 ft from the site. The Bioscreen model was used to predict levels of benzene, ethylbenzene, and toluene in groundwater where it discharges to the marsh. Although it is likely that aerobic degradation is occurring in the groundwater, the more conservative anaerobic degradation values were used for all three chemicals in the model. Using this conservative evaluation, all three chemicals were well below RBSLs at the receptor point. Bioscreen input and output figures are located in Appendix H.

Lead is not subject to environmental degradation, therefore, lead concentrations were predicted for the marsh area by using the steady state attenuation calculation from the ASTM standard. Results of this model indicate that levels of lead are expected to be an order of magnitude lower than the current MCL for drinking water of 15 ug/l. Calculations are included as Appendix H.

The modeling results predict that surface water impact will be insignificant since all COCs in discharging groundwater will be at levels well below the RBSLs and MCLs if the plume intercepts the marsh area.

Future On-Site Worker Receptor

A possible future receptor is an on-site worker digging a trench 3 to 4 ft deep that would intercept the water table. Dermal contact with groundwater could occur at this depth. In order to be conservative, current maximum concentration values of COCs in groundwater were used for the risk and hazard index calculations, even though this is a future scenario. Carcinogenic risk from dermal contact with benzene in groundwater was calculated to be 4.3×10^{-7}, which is well below the target risk of 1×10^{-6}. The hazard index (HI) for ethylbenzene was 3.97×10^{-2}, and for toluene was 3.2×10^{-3}. Both of these values are also well below the target HI of 1 for non-carcinogenic risk. Lead was not evaluated because it was assumed that a future on-site worker digging a trench would not drink the groundwater. Given that future biodegradation and dispersion will occur, the risk and hazard quotients will become even lower over time as concentrations within the groundwater plume decrease.

An on site worker could also be exposed to volatile air emissions from groundwater. Assuming no dispersion of concentrations due to wind, and using the maximum detected concentration of benzene in groundwater, the carcinogenic risk was calculated to be 1.07×10^{-8}. This calculation is presented in Appendix H. This number is very conservative because actual concentrations, and therefore risk, would be considerably lower when coastal wind conditions are considered.

7.6 RECOMMENDATIONS

Current site conditions indicate that there are no complete exposure pathways and, therefore, no risk. In future scenarios there are potentially complete pathways, however, the risk and hazard index evaluations indicate that future risk will be within acceptable limits (below 1×10^{-6} for carcinogenic risk, and below an HQ of 1 for non-carcinogenic risk). Additionally, predicted plume migration towards the marsh area indicates that all constituents in groundwater will be below MCLs before the surface water body is intercepted. Therefore, no further action is recommended.

8.0 SUMMARY AND RECOMMENDATIONS

8.1 SUMMARY

During the CAR investigation at the AVGAS pipeline in October and November 1996, B&R Environmental performed soil-gas and groundwater screening, monitoring well installation, well development, aquifer characterization testing, and soil and groundwater sampling to characterize the hydrogeologic conditions and to investigate the extent of contamination in the soil and groundwater at the site. The following summary is based on the results of the investigation and risk assessment performed utilizing the data.

- A water well inventory found no domestic drinking water wells within 1000 ft of the site. Two former water supply wells are located at the MCRD Parris Island but are 1.3 miles west and 1.8 miles north of the site; both wells are inactive. Potable water for Parris Island is supplied by the Beaufort-Jasper Water Sewer Authority.

- The nearest sensitive habitat is a marsh area approximately 1700 ft southwest of the site which is also downgradient of the site.

- Soil-gas samples were collected from 32 locations at the Truck Fuel Dispensing Station and 23 locations at the Henderson Street Area using direct-push methods. Samples were analyzed for BTEX and MTBE using a field GC. These results were used to select locations for the collection of groundwater samples for screening analysis.

- Groundwater screening samples were collected from 13 locations at the Truck Fuel Dispensing Station and 10 locations at the Henderson Street Area using direct-push methods. The samples were analyzed for BTEX and MTBE using a field GC. Groundwater analytical results detected low concentrations (below RBSLs) of xylene (10.3 ug/L at G37) and ethylbenzene (11.1 ug/L at G41) at the Henderson Street Area. No additional monitoring wells were recommended for the Henderson Street Area based on screening results. One groundwater sample (G13) at the Truck Fuel Dispensing Station detected benzene at 745 ug/l and xylene at 16.4 ug/l. Based on the groundwater screening results and groundwater concentrations that exceeded groundwater RBSLs at monitoring well PAI-AVGAS-1C in April 1995, six additional monitoring wells were recommended by B&R Environmental.

- The SCDHEC approved the six proposed monitoring well locations in November 1996 and well installation began on November 12, 1996. Five shallow monitoring wells were installed at the Truck Fuel Dispensing Station to a depth of approximately 12 ft bls. One deeper monitoring well was installed to a depth of approximately 23 ft bls. The monitoring wells were developed and groundwater samples collected from all wells.

- Soils at the site consist of silty, very fine-grained sand that is reddish-to yellowish-brown and light gray. The sand is approximately 14 ft thick and is underlain by a bluish-gray clayey sand approximately 4 ft thick. The lowermost interval sampled was a dark, olive-gray sandy clay and interbedded bluish-gray sand at a depth of 20 ft bls.
- Groundwater at the site was encountered at approximately 4 ft bls. The groundwater flow direction is to the south and southwest.
- The calculated average hydraulic gradient at the site is 0.004.
- Six rising-head slug tests were performed at the newly installed wells. The calculated average hydraulic conductivity at the site is 3.76×10^{-3} cm/sec.
- The calculated seepage velocity is 61.3 ft/yr.
- Soil samples were collected from above the water table from each well boring and sent to GEL for laboratory analysis. The only BTEX compounds detected were low concentrations of toluene (0.0003J mg/kg) and xylene (0.0008J mg/kg) in the soil sample from PAI-MW01 at a depth of one foot bls. GRO concentrations ranged from 0.0047J mg/kg at PAI-MW04 to 0.0568 mg/kg at PAI-MW02. Total lead concentrations ranged from 3.0 mg/kg at PAI-MW01 to 8.4 mg/kg at PAI-MW02.
- Laboratory results of groundwater samples collected in November 1996, showed concentrations of benzene, toluene, ethylbenzene, and lead in groundwater exceeding RBSLs at the Truck Fuel Dispensing Station. The maximum concentrations of detected compounds in groundwater were from the sample from PAI-MW05, except for benzene which had a maximum concentration in the sample collected at PAI-MW03. GRO at 4.8J ug/l in monitoring well PAI-AVGAS-2C was the only contaminant of interest detected at the Henderson Street Area.
- The groundwater plume at the Truck Fuel Dispensing Station is approximately 150 ft wide and 200 ft long. The lateral extent of the plume has been determined except in the downgradient direction where it has been estimated. The vertical extent of the plume extends to at least 24 ft bls where interbedded clay layers were encountered.

8.2 RECOMMENDATIONS

Data collected during this investigation at the Henderson Street Area did not show any evidence of contaminants in groundwater exceeding RBSLs, and impacted soils along the former AVGAS pipeline were excavated and removed during pipeline removal. A no further action status, therefore, is recommended for this area.

Concentrations of contaminants in groundwater were documented at the Truck Fuel dispensing Station. Current site conditions indicate, however, that there are no complete exposure pathways. Therefore, no risk exists at the Truck Fuel Dispensing Station. In future scenarios there are potentially complete pathways, however, the risk exists and hazard quotient evaluations indicate that future risk will be within acceptable limits (below 1×10^{-6} for carcinogenic risk, and below an HQ of 1 for non-carcinogenic risk). Additionally, modeling of the groundwater plume migration towards the marsh area predicts that all constituents in groundwater will be below MCLs before the marsh is intercepted. Therefore, no further action is recommended at the Truck Fuel Dispensing Station.

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APPENDIX A

SOIL-GAS RESULTS

DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

MTBE/BTEX ANALYSIS OF VAPOR (EPA METHOD 8020)

DATA REPORTED IN MICROGRAMS PER LITER OF VAPOR (ug/l-v)

SAMPLE ID	DATE COLLECTED	DATE ANALYZED	MTBE (ug/l-v)	BENZENE (ug/l-v)	TOLUENE (ug/l-v)	ETHBENZ (ug/l-v)	XYLENES (ug/l-v)	TOT. BTEX (ug/l-v)	Data Qualifiers	PQL
BLANK	----	10/28/96	ND	ND	ND	ND	ND	**ND**		1.0
APG-SG-G01-03	10/28/96	10/28/96	ND	2.1	4.3	3.3	10.2	**19.9**		1.0
APG-SG-G02-03	10/28/96	10/28/96	ND	ND	2.4	1.8	5.7	**9.9**		1.0
APG-SG-G03-03	10/28/96	10/28/96	ND	ND	2.4	2.1	6.5	**11.0**		1.0
BLANK	----	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G08-02	10/29/96	10/29/96	ND	85.2	38.8	ND	ND	**124.0**		1.0
AGP-SG-G04-02	10/29/96	10/29/96	ND	3.0	2.1	1.1	3.5	**9.7**		1.0
AGP-SG-G05-02	10/29/96	10/29/96	ND	1.1	1.0	ND	2.7	**4.8**		1.0
AGP-SG-G06-02	10/29/96	10/29/96	ND	ND	1.0	ND	3.1	**3.1**		1.0
AGP-SG-G07-02	10/29/96	10/29/96	ND	ND	ND	ND	1.1	**1.1**		1.0
APG-SG-G09-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
APG-SG-G10-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
APG-SG-G11-02	10/29/96	10/29/96	ND	ND	1.1	ND	3.3	**3.3**		1.0
APG-SG-G12-02	10/29/96	10/29/96	ND	ND	ND	ND	3.8	**3.8**		1.0
APG-SG-G13-02	10/29/96	10/29/96	ND	ND	ND	ND	2.7	**2.7**		1.0
APG-SG-G14-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
APG-SG-G15-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
APG-SG-G16-02	10/29/96	10/29/96	ND	ND	ND	ND	1.3	**1.3**		1.0
APG-SG-G17-02	10/29/96	10/29/96	ND	ND	ND	ND	1.2	**1.2**		1.0
APG-SG-G18-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
APG-SG-G19-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE *Barton Moore*

DATA QUALIFIERS

MI = MATRIX INTERFERENCE
D = ALL SAMPLE VALUES OBTAINED BY DILUTION, PQL IS ADJUSTED ACCORDINGLY
d = INDIVIDUAL VALUE OBTAINED BY DILUTION
` = ESTIMATED CONCENTRATION(S)

96099G1A.XLS

3600-C KENNESAW N. IND. PKWY KENNESAW, GA 30144 770-919-0805 FAX 770-919-0806

teg

DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

MTBE/BTEX ANALYSIS OF VAPOR (EPA METHOD 8020)

DATA REPORTED IN PARTS PER MILLION by VOLUME (PPMv)

SAMPLE ID	DATE COLLECTED	DATE ANALYZED	MTBE (PPMv)	BENZENE (PPMv)	TOLUENE (PPMv)	ETHBENZ (PPMv)	XYLENES (PPMv)	TOT. BTEX (PPMv)	Data Qualifiers	PQL
BLANK	—	10/28/96	ND	ND	ND	ND	ND	**ND**		0.2
APG-SG-G01-03	10/28/96	10/28/96	ND	0.647	1.122	0.746	2.305	**4.820**		0.2
APG-SG-G02-03	10/28/96	10/28/96	ND	ND	0.626	0.407	1.288	**2.321**		0.2
APG-SG-G03-03	10/28/96	10/28/96	ND	ND	0.626	0.475	1.469	**2.570**		0.2
BLANK	—	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G08-02	10/29/96	10/29/96	ND	26.242	10.127	ND	ND	**36.368**		0.2
AGP-SG-G04-02	10/29/96	10/29/96	ND	0.924	0.548	0.249	0.791	**2.512**		0.2
AGP-SG-G05-02	10/29/96	10/29/96	ND	0.339	0.261	ND	0.610	**1.210**		0.2
AGP-SG-G06-02	10/29/96	10/29/96	ND	ND	0.261	ND	0.701	**0.962**		0.2
AGP-SG-G07-02	10/29/96	10/29/96	ND	ND	ND	ND	0.249	**0.249**		0.2
APG-SG-G09-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
APG-SG-G10-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
APG-SG-G11-02	10/29/96	10/29/96	ND	ND	0.287	ND	0.746	**1.033**		0.2
APG-SG-G12-02	10/29/96	10/29/96	ND	ND	ND	ND	0.859	**0.859**		0.2
APG-SG-G13-02	10/29/96	10/29/96	ND	ND	ND	ND	0.610	**0.610**		0.2
APG-SG-G14-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
APG-SG-G15-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
APG-SG-G16-02	10/29/96	10/29/96	ND	ND	ND	ND	0.294	**0.294**		0.2
APG-SG-G17-02	10/29/96	10/29/96	ND	ND	ND	ND	0.271	**0.271**		0.2
APG-SG-G18-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
APG-SG-G19-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE Barton Moore

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E = ESTIMATED CONCENTRATION(S)

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DATA REPORT

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OAK RIDGE, TENNESSEE 37830

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SAMPLE ID	DATE COLLECTED	DATE ANALYZED	MTBE (ug/l-v)	BENZENE (ug/l-v)	TOLUENE (ug/l-v)	ETHBENZ (ug/l-v)	XYLENES (ug/l-v)	TOT. BTEX (ug/l-v)	Data Qualifiers	PQL
AGP-SG-G20-02	10/29/96	10/29/96	ND	ND	ND	ND	1.1	**1.1**		1.0
AGP-SG-G21-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G22-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		1.0
BLANK	----	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G23-02	10/29/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G24-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G25-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G26-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G27-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G28-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G29-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G30-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G31-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G32-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G33-02	10/30/96	10/30/96	ND	1.2	3.5	ND	ND	**4.7**		1.0
AGP-SG-G34-02	10/30/96	10/30/96	ND	ND	ND	ND	1.0	**1.0**		1.0
AGP-SG-G35-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G36-02	10/30/96	10/30/96	ND	ND	ND	ND	1.2	**1.2**		1.0
AGP-SG-G37-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**0**		1.0
AGP-SG-G38-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0
AGP-SG-G39-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		1.0

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
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d = INDIVIDUAL VALUE OBTAINED BY DILUTION
* = ESTIMATED CONCENTRATION(S)

96099G1B.XLS

DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
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CLIENT PROJECT # 7387

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AGP-SG-G20-02	10/29/96	10/29/96	ND	ND	ND	ND	0.249	**0.249**		0.2
AGP-SG-G21-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G22-02	10/29/96	10/29/96	ND	ND	ND	ND	ND	**ND**		0.2
BLANK	----	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G23-02	10/29/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G24-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G25-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G26-02	10/30/96	10/30/96	ND	ND	ND	NED	ND	**ND**		0.2
AGP-SG-G27-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G28-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G29-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G30-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G31-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G32-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G33-02	10/30/96	10/30/96	ND	0.370	0.914	ND	ND	**1.283**		0.2
AGP-SG-G34-02	10/30/96	10/30/96	ND	ND	ND	ND	0.226	**0.226**		0.2
AGP-SG-G35-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G36-02	10/30/96	10/30/96	ND	ND	ND	ND	0.271	**0.271**		0.2
AGP-SG-G37-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G38-02	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2
AGP-SG-G39-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	**ND**		0.2

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE Barton Moore

DATA QUALIFIERS

MI = MATRIX INTERFERENCE
D = ALL SAMPLE VALUES OBTAINED BY DILUTION, PQL IS ADJUSTED ACCORDINGLY
d = INDIVIDUAL VALUE OBTAINED BY DILUTION
E = ESTIMATED CONCENTRATION(S)

96099G1B.XLS

DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

MTBE/BTEX ANALYSIS OF VAPOR (EPA METHOD 8020)

DATA REPORTED IN MICROGRAMS PER LITER OF VAPOR (ug/l-v)

SAMPLE ID	DATE COLLECTED	DATE ANALYZED	MTBE (ug/l-v)	BENZENE (ug/l-v)	TOLUENE (ug/l-v)	ETHBENZ (ug/l-v)	XYLENES (ug/l-v)	TOT. BTEX (ug/l-v)	Data Qualifiers	PQL
AGP-SG-G40-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G41-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G42-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	ND		1.0
BLANK	—	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G43-01	10/30/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G44-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G45-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G46-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G47-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G48-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G49-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G50-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G51-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G52-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G53-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G54-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0
AGP-SG-G55-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		1.0

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE

Barton Moore

DATA QUALIFIERS

MI = MATRIX INTERFERENCE
D = ALL SAMPLE VALUES OBTAINED BY DILUTION, PQL IS ADJUSTED ACCORDINGLY
d = INDIVIDUAL VALUE OBTAINED BY DILUTION
E = ESTIMATED CONCENTRATION(S)

96099G1C.XLS

DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

MTBE/BTEX ANALYSIS OF VAPOR (EPA METHOD 8020)

DATA REPORTED IN PARTS PER MILLION by VOLUME (PPMv)

SAMPLE ID	DATE COLLECTED	DATE ANALYZED	MTBE (PPMv)	BENZENE (PPMv)	TOLUENE (PPMv)	ETHBENZ (PPMv)	XYLENES (PPMv)	TOT. BTEX (PPMv)	Data Qualifiers	PQL
AGP-SG-G40-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G41-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G42-01	10/30/96	10/30/96	ND	ND	ND	ND	ND	ND		0.2
BLANK	----	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G43-01	10/30/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G44-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G45-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G46-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G47-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G48-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G49-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G50-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G51-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G52-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G53-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G54-02	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2
AGP-SG-G55-01	10/31/96	10/31/96	ND	ND	ND	ND	ND	ND		0.2

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE Barton Moore

DATA QUALIFIERS

MI = MATRIX INTERFERENCE
D = ALL SAMPLE VALUES OBTAINED BY DILUTION, PQL IS ADJUSTED ACCORDINGLY
d = INDIVIDUAL VALUE OBTAINED BY DILUTION
E = ESTIMATED CONCENTRATION(S)

96099G1C.XLS

3600-C KENNESAW N. IND. PKWY KENNESAW, GA 30144 770-919-0805 FAX 770-919-0806

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown + Root Environmental
ADDRESS: 800 Oak Ridge Turnpike Suite A-600
CITY: Oak Ridge STATE: TN ZIP: 37830
PHONE: (423) 483-9900 FAX: (423) 483-2014
CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/18/96 PAGE 1 OF 1
TEG PROJECT #: 96099.01
LOCATION: Parris Is[illegible] Depot, Parris Island, SC
COLLECTOR: [illegible] DATE OF COLLECTION: 10/18/96

Sample Number	Depth	Time	Sample Type	Container Type	ANALYSES	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-SG-G103	3'	16:52	Vapor	Tedlar Bag		X																	
AGP-SG-G203	3'	[illegible]	↓	↓		X																	
AGP-SG-G303	3'	1737	↓	↓		X																	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	10/28/96	Michael [signature]	10/28/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

teg

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown & Root Environmental

ADDRESS: 800 Oak Ridge Tnpk, Suite A-600

PHONE: (423) 483-9900 FAX: (423) 483-2014

CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/29/96 PAGE 1 OF 2

TEG PROJECT #: 96099-61

LOCATION: Marines Corps Recruit Depot, Parris Island, SC

COLLECTOR: TEG Southeast DATE OF COLLECTION: 10/29/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-SG-G08	02	0834	SG	Tetlar bag	X																	
AGP-SG-G04-02		0852	SG		X																	
AGP-SG-G05	02	0929	SG		X																	
AGP-SG-G06	02	0955	SG		X																	
AGP-SG-G07	02	1011	SG		X																	
AGP-SG-G09	02	1040	SG		X																	
AGP-SG-G10	02	1116	SG		X																	
AGP-SG-G11	02	1144	SG		X																	
AGP-SG-G12	02	1157	SG		X																	
AGP-SG-G13	02	1212	SG		X																	
AGP-SG-G14	02	1410	SG		X																	
AGP-SG-G15	02	1428	SG		X																	
AGP-SG-G16	02	1445	SG		X																	
AGP-SG-G17	02	1459	SG		X																	
AGP-SG-G18	02	1516	SG		X																	
AGP-SG-G19	02	1547	SG		X																	
AGP-SG-G20	02	1608	SG		X																	
AGP-SG-G21	02	1627	SG		X																	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	10/29/96	[signature]	10/29/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown+Root Environmental
ADDRESS: 800 Oak Ridge Trnpk Ste A-600 OR, TN
PHONE: (423) 483-9900 FAX: (423) 483-2014
CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/29/96 PAGE 2 OF 2
TEG PROJECT #: 96099-61
LOCATION: Marines Corps Recruit Depot, Parris Island, SC
COLLECTOR: TEG-Southeast DATE OF COLLECTION: 10/29/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-SG-622	02	1640	SG	Tetlar bags		X																
AGP-SG-623	02	1702	SG	Tetlar bag		X																

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	10/29/96	[signature]	10/29/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS
☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY,

CHAIN-OF-CUSTODY RECORD

P.O. #:

CLIENT: Brown + Root Environmental

ADDRESS: 800 Oak Ridge Trnpk, Ste A-600, Oak Ridge, TN 37830

PHONE: (423) 483-9900 FAX: (423) 483-2014

CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/30/96 PAGE 1 OF 2

TEG PROJECT #: 96099-61

LOCATION: MCRD, Parris Island, SC

COLLECTOR: TEG Southeast DATE OF COLLECTION: 10/30/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-SG-G24	02	0744	SG	Tedlar bag		X																
AGP-SG-G25	02	0814	SG			X																
AGP-SG-G26	02	0847	SG			X																
AGP-SG-G27	02	0905	SG			X																
AGP-SG-G28	02	0937	SG			X																
AGP-SG-G29	02	1003	SG			X																
AGP-SG-G30	02	1049	SG			X																
AGP-SG-G31	02	1108	SG			X																
AGP-SG-G32	02	1244	SG			X																
AGP-SG-G33	02	1303	SG			X																
AGP-SG-G34	02	1320	SG			X																
AGP-SG-G35	02	1345	SG			X																
AGP-SG-G36	02	1452	SG			X																
AGP-SG-G37	02	1523	SG			X																
AGP-SG-G38	02	1543	SG			X																
AGP-SG-G39	02	1608	SG			X																
AGP-SG-G40	01	1634	SG			X																
AGP-SG-G41	01	1653	SG			X																

RELINQUISHED BY (Signature): [signature] DATE/TIME: 10/30/96

RECEIVED BY (Signature): Michael Slade DATE/TIME: 10/30/96

RELINQUISHED BY (Signature) DATE/TIME

RECEIVED BY (Signature) DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown + Root Environmental

ADDRESS: 800 Oak Ridge Trnpk, Ste A-600, ~~Oak Ridge, TN 37830~~

CITY: Oak Ridge STATE: TN ZIP: 37830

PHONE: (423)483-9900 FAX: (423)483-2014

CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/30/96 PAGE 2 OF 2

TEG PROJECT #: 96099.01

LOCATION: MCRD, Parris Island, SC.

COLLECTOR: TEG Southeast DATE OF COLLECTION: 10/30/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS					FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-SG-G42	01	1708	SG	Tetlar Bag	X																					
AGP-SG-G43	01	1723	SG	|	X																					

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	10/30/96	Michael [signature]	10/30/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown + Root Environmental
ADDRESS: 800 Oak Ridge Tnpk, Ste A-600
CITY: Oak Ridge STATE: TN ZIP: 37830
PHONE: (423) 483-9900 FAX: (423) 483-2014
CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/31/96 PAGE 1 OF 2
TEG PROJECT #: 96099-61
LOCATION: MCRD, Paris Island, SC.
COLLECTOR: TEG Southeast DATE OF COLLECTION: 10/31/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS					FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-SG-G44	01	0711	SG	Tedlar Bag	X																					
AGP-SG-G45	01	0729	SG		X																					
AGP-SG-G46	01	0744	SG		X																					
AGP-SG-G47	01	0812	SG		X																					
AGP-SG-G48	02	0834	SG		X																					
AGP-SG-G49	02	0856	SG		X																					
AGP-SG-G50	02	0929	SG		X																					
AGP-SG-G51	01	0949	SG		X																					
AGP-SG-G52	01	1014	SG		X																					
AGP-SG-G53	02	1053	SG		X																					
AGP-SG-G54	02	1130	SG		X																					
AGP-SG-G55	01	1311	SG		X																					
AGP-GW-G45	04	1350	GW	2 40 ml	X																					
AGP-GW-G52	04	1415	GW		X																					
AGP-GW-G41	-	1440	GW		X																					
AGP-GW-G39	-	1505	GW		X																					
AGP-GW-37	-	1530	GW		X																					

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	10/31/96	Michael [signature]	10/31/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

APPENDIX B

GROUNDWATER SCREENING RESULTS

DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

BTEX/MTBE ANALYSIS OF WATER (EPA METHOD 8020)

DATA REPORTED IN MICROGRAMS PER LITER (PPB)

SAMPLE ID	DATE COLLECTED	DATE ANALYZED	MTBE (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHBENZ (ug/L)	XYLENES (ug/L)	TOT. BTEX (ug/L)	Surrogate Recov. (%)	Data Qualifiers	PQL
METHOD BLANK	—	10/31/96	ND	ND	ND	ND	ND	**ND**	87.4		2.0
AGP-GW-G45	10/31/96	10/31/96	ND	ND	ND	ND	ND	**ND**	94.7		2.0
AGP-GW-G52	10/31/96	10/31/96	ND	ND	ND	ND	ND	**ND**	94.5		2.0
AGP-GW-G41	10/31/96	10/31/96	ND	ND	ND	11.1	ND	**11.1**	MI	E	2.0
AGP-GW-G39	10/31/96	10/31/96	ND	ND	ND	ND	ND	**ND**	95.2		2.0
AGP-GW-G37	10/31/96	10/31/96	ND	ND	ND	ND	10.3	**10.3**	133		2.0
AGP-GW-G36	10/31/96	10/31/96	ND	ND	ND	ND	ND	**ND**	97.1		2.0
AGP-DP-G36	10/31/96	10/31/96	ND	ND	ND	ND	ND	**ND**	94.6		2.0
AGP-GW-G34	10/31/96	10/31/96	ND	ND	ND	ND	ND	**ND**	89.4		2.0
AGP-GW-G34 DUP	10/31/96	10/31/96	ND	ND	ND	ND	ND	**ND**	94.6		2.0
METHOD BLANK	—	11/1/96	ND	ND	ND	ND	ND	**ND**	97.9		2.0
AGP-GW-G31	10/31/96	11/1/96	ND	ND	ND	ND	ND	**ND**	91.3		2.0
AGP-GW-G33	10/31/96	11/1/96	ND	ND	ND	ND	ND	**ND**	92.3		2.0
AGP-GW-G17	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	80.4		2.0
AGP-GW-G06	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	95.9		2.0
AGP-GW-G04	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	95.8		2.0
AGP-GW-G13	11/1/96	11/1/96	ND	745*	ND	ND	16.4	**761.4**	88.9	*d	2.0
AGP-GW-G29	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	95.2		2.0
AGP-GW-G11	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	94.0		2.0
AGP-GW-G28	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	100		2.0
AGP-GW-G20	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	98.2		2.0
AGP-GW-G02	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	94.5		2.0
AGP-GW-G56	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	96.2		2.0

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE Barton Moore

DATA QUALIFIERS

MI = MATRIX INTERFERENCE
DO = SURROGATE SPIKE DILUTED OUT
D = ALL SAMPLE VALUES OBTAINED BY DILUTION, PQL IS ADJUSTED ACCORDINGLY
d = INDIVIDUAL VALUE OBTAINED BY DILUTION
E = ESTIMATED CONCENTRATION(S), HIGH SURROGATE RECOVERY DUE TO INTERFERING MATRIX PEAK
96099G1D.XLS

QA/QC DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

BTEX/MTBE ANALYSIS OF WATER (EPA METHOD 8020)

DATE ANALYZED: 10/31/96

	MTBE (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHBENZ (ug/L)	XYLENES (ug/L)
MATRIX SPIKE					
SPIKED CONC.	50.0	50.0	50.0	50.0	150.0
MEASURED CONC.	46.0	51.7	48.4	47.9	142.2
% RECOVERY	92.0%	103.4%	96.9%	95.7%	94.8%
MATRIX SPIKE DUPLICATE					
SPIKED CONC.	50.0	50.0	50.0	50.0	150.0
MEASURED CONC.	49.5	51.8	48.2	47.2	141.4
% RECOVERY	98.9%	103.7%	96.3%	94.3%	94.3%
RELATIVE PERCENT DIFFERENCE (RPD)	7.2%	0.3%	0.6%	1.5%	0.6%

ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE Barton Moore

96099G1D.XLS

DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

BTEX/MTBE ANALYSIS OF WATER (EPA METHOD 8020)

DATA REPORTED IN MICROGRAMS PER LITER (PPB)

SAMPLE ID	DATE COLLECTED	DATE ANALYZED	MTBE (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHBENZ (ug/L)	XYLENES (ug/L)	TOT. BTEX (ug/L)	Surrogate Recov. (%)	Data Qualifiers	PQL
AGP-GW-G01	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	93.7		2.0
AGP-GW-G01 DUP	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	91.8		2.0
AGP-GW-G57	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	103		2.0
AGP-GW-G03	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	101		2.0
AGP-DP-G03	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	102		2.0
AGP-GW-G58	11/1/96	11/1/96	ND	ND	ND	ND	ND	**ND**	98.1		2.0

"ND" INDICATES ANALYTE NOT DETECTED AT OR ABOVE LISTED PRACTICAL QUANTITATION LIMITS (PQL'S)
ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE Barton Moore

DATA QUALIFIERS

MI = MATRIX INTERFERENCE
DO = SURROGATE SPIKE DILUTED OUT
D = ALL SAMPLE VALUES OBTAINED BY DILUTION, PQL IS ADJUSTED ACCORDINGLY
d = INDIVIDUAL VALUE OBTAINED BY DILUTION
E = ESTIMATED CONCENTRATION(S)

96099G1E.XLS

teg

QA/QC DATA REPORT

BROWN AND ROOT ENVIRONMENTAL
800 OAK RIDGE TURNPIKE, SUITE A-600
OAK RIDGE, TENNESSEE 37830

MARINES CORPS RECRUIT DEPOT, PARRIS ISLAND, SOUTH CAROLINA
CLIENT PROJECT # 7387

TEG PROJECT # 96099-G1

BTEX/MTBE ANALYSIS OF WATER (EPA METHOD 8020)

DATE ANALYZED: 11/1/96

	MTBE (ug/L)	BENZENE (ug/L)	TOLUENE (ug/L)	ETHBENZ (ug/L)	XYLENES (ug/L)
MATRIX SPIKE					
SPIKED CONC.	50.0	50.0	50.0	50.0	150.0
MEASURED CONC.	50.2	52.0	49.5	48.3	144.5
% RECOVERY	100.4%	104.0%	98.9%	96.6%	96.3%
MATRIX SPIKE DUPLICATE					
SPIKED CONC.	50.0	50.0	50.0	50.0	150.0
MEASURED CONC.	49.1	51.5	48.9	48.3	143.4
% RECOVERY	98.3%	102.9%	97.9%	96.5%	95.6%
RELATIVE PERCENT DIFFERENCE (RPD)	2.2%	1.0%	1.0%	0.1%	0.8%

ANALYSIS PERFORMED IN TEG'S CERTIFIED MOBILE LABORATORY
ANALYSIS PERFORMED BY: MIKE INGLE
DATA REVIEWED BY: BARTON MOORE

Barton Moore

96099G1E.XLS

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

teg

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown + Root Environmental

ADDRESS: 800 Oak Ridge Tnpk, Ste A-600

CITY: Oak Ridge STATE: TN ZIP: 37830

PHONE: (423) 483-9900 FAX: (423) 483-2014

CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/31/96 PAGE 1 OF 2

TEG PROJECT #: 96099.61

LOCATION: MCRD, Paris Island, SC.

COLLECTOR: TEG Southeast DATE OF COLLECTION: 10/31/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS						FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-SG-G44	01	0711	SG	Tetlar Bag		X																					
AGP-SG-G45	01	0729	SG			X																					
AGP-SG-G46	01	0744	SG			X																					
AGP-SG-G47	01	0812	SG			X																					
AGP-SG-G48	02	0834	SG			X																					
AGP-SG-G49	02	0856	SG			X																					
AGP-SG-G50	02	0929	SG			X																					
AGP-SG-G51	01	0949	SG			X																					
AGP-SG-G52	01	1014	SG			X																					
AGP-SG-G53	02	1053	SG			X																					
AGP-SG-G54	02	1130	SG			X																					
AGP-SG-G55	01	1311	SG			X																					
AGP-GW-G45	04	1350	GW	2 40 ml		X																					
AGP-GW-G53	04	1415	GW			X																					
AGP-GW-G41	-	1440	GW			X																					
AGP-GW-G39	-	1505	GW			X																					
AGP-GW-37	-	1530	GW			X																					

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	10/31/96	Michael [signature]	10/31/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC. (teg)

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown+Root Environmental
ADDRESS: 800 Oak Ridge Tnpk, Ste A-600
CITY: Oak Ridge STATE: TN ZIP: 37830
PHONE: (423) 483-9900 FAX: (423) 483-2014
CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 10/31/96 PAGE 2 OF
TEG PROJECT #: 96099-61
LOCATION: MCRD, Parris Island, SC.
COLLECTOR: TEG Southwest DATE OF COLLECTION: 10/31/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-GW-G36	—	1552	GW	2 40ml glass		X																
AGP-DP-G36	—	1552	GW			X																
AGP-GW-G34	—	1630	GW			X																
AGP-GW-G33	—	1700	GW			X																
AGP-GW-G33	—	1710	GW			X																

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	10/31/96	Michael Slade	10/31/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

CHAIN-OF-CUSTODY RECORD

CLIENT: Brown + Root Environmental
ADDRESS: 800 Oak Ridge Turnpike Suite A-600
CITY: Oak Ridge STATE: TN ZIP: 37830
PHONE: (423) 483-9900 FAX: (423) 483-2014
CLIENT PROJECT #: 7387 PROJECT MANAGER: Bryn Howze

DATE: 11/1/96 PAGE 1 OF 2
TEG PROJECT #: 96099-61
LOCATION: MCRD, Parris Island, SC.
COLLECTOR: TEG Southeast DATE OF COLLECTION: 11/1/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS	FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-GW-G17		0756	GW	40 ml Vial		✓																
AGP-GW-606		0840	GW	40 ml Vial		✓																
AGP-GW-604		0910	GW	40 ml Vial		✓																
AGP-GW-G13		0945	GW	40ml Vial		✓																
AGP-GW-G29		1010	GW			✓																
AGP-GW-G11		1025	GW			✓																
AGP-GW-G28		1048	GW			✓																
AGP-GW-G20		1110	GW			✓																
~~AGP-DP-G20~~		~~1110~~	~~GW~~			~~✓~~														Do not Run per client (MF) Don't Run unless AGP-GW-G20 is sm		
AGP-GW-G02		1145	GW	40 ml Vial		✓																
~~AGP-DP-G02~~		~~1145~~	~~GW~~			~~✓~~														Don't Run per client		
AGP-GW-G56		1207	GW			✓																
~~AGP-DP-G56~~		~~1207~~	~~GW~~			~~✓~~														Don't Run per client		
AGP-GW-G01		1245	GW			✓																
AGP-GW-G57		1335	GW			✓																
AGP-GW-G03		1400	GW			✓																
AGP-DP-G03		1400	GW			✓																

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	11/1/96	Michael [signature]	11/1/96
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

teg TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY, INC.

CHAIN-OF-CUSTODY RECORD

CLIENT: Same as Page #1 11/1/96
ADDRESS:
CITY: STATE: ZIP:
PHONE: FAX:
CLIENT PROJECT #: PROJECT MANAGER:

DATE: 11/1/96 PAGE 2 OF 2
TEG PROJECT #: 96099-01
LOCATION: MCRD, Parris Island, SC.

COLLECTOR: TEG Southeast DATE OF COLLECTION: 11/1/96

Sample Number	Depth	Time	Sample Type	Container Type	VOA 601/8010	VOA 602/8020	VOA 624/8240	Semi Vol 625/8270	TPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (g & d)	PNA 610/8100	PEST/PCBs 8080	HEX CHROME	ORGANIC LEAD	TOTAL LEAD	pH	ASBESTOS					FIELD NOTES	Total Number Of Containers	Laboratory Note Number
AGP-GW-G58		1430	GW	2 40ml Vot		✓																				

RELINQUISHED BY: (Signature) [signature] DATE/TIME 11/1/96 RECEIVED BY: (Signature) Michael S[illegible] DATE/TIME

RELINQUISHED BY: (Signature) DATE/TIME RECEIVED BY: (Signature) DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS
CHAIN OF CUSTODY SEALS Y/N/NA
SEALS INTACT? Y/N/NA
RECEIVED GOOD COND./COLD
NOTES:

LABORATORY NOTES:

APPENDIX C

DIRECT-PUSH BORING LOGS

BORING LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic push

BORING NUMBER: G01
DATE: 10/28/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA											
SG													
	4						Sand, vfg						
							TD - 4 ft		AGP - ~~SG~~ - G01 - ~~01~~ 03				
							Water @ ~4'						
GW	6.5								AGP - GW - G01				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: New G01 pushed to 6.5' for gw sampling 11/1/96

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: Hydraulic push

BORING NUMBER: AGP-G02
DATE: 10/28/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete 0-4"						
SG	3												
~~SG~~							Sand, vfg		AGP-SG-G02-03				
							~~TD 3'~~						
GW	6.5								AGP-GW-G02				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: New hole pushed to 6.5 & GW sample collected 11/1/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: Hydraulic rig

BORING NUMBER: AGP-603
DATE: 10/28/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	3						Sand, vfg ~~FD 3'~~ JMH		APG-SG-603-03				
GW	6.5								AGP-GW-603				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #:

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: Hydraulic Probe

BORING NUMBER: AGP-604
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2.5						SAND, vfg		AGP-SG-604-02				
							~~TD 2.5~~						
GW	6.0						SAND, vfg, lgt brown		AGP-GW-604				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Advanced to 6 + collected gw sample on 11/1/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: Hydraulic Probe

BORING NUMBER: AGP-G05
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
	2.5						SAND		AGP-SG-G05-02				
							TD 2.5'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G06
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness (MATERIAL DESCRIPTION)	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2.3						SAND, vfg		AGP-SG-G06-02				
GW	4.0						~~TD 2.3'~~		AGP-GW-G06				
	5.0												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole pushed to 5' & gw sampled on 11/1/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-607
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2.3						SAND		AGP-SG-607-02				
							TD 2.3						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: Hydraulic Probe

BORING NUMBER: AGP-G08
DATE: 10/29/96
GEOLOGIST: J Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	3						Sand, vfg		AGP-SG-G08-02				
							TD-3'						
									Water @2.5'				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD, Parris Is

PROJECT NUMBER: 7387

DRILLING COMPANY: TEG

DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: ASG-G09

DATE: 10/29/96

GEOLOGIST: J. Hofer

DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2.0						SAND vfg		AGP-SG-G09-02				
							TD - 2.0 ft						
									High tide pushing				
									WL up				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G10
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND, vfg		AGP-SG-G10-02				
							TD 2.0						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Rig

BORING NUMBER: AGP-G11
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness (MATERIAL DESCRIPTION)	Color (MATERIAL DESCRIPTION)	Material Classification (MATERIAL DESCRIPTION)	USCS*	Remarks	Sample (PID/FID Reading (ppm))	Sampler BZ (PID/FID Reading (ppm))	Borehole** (PID/FID Reading (ppm))	Driller BZ** (PID/FID Reading (ppm))
	0	NA	NA										
SG	2						SAND, vfg		AGP-SG-G11-02				
		NA					~~TD 2.0'~~						
GW	6.0						TD 6.0		AGP-GW-G11				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Advanced to 6' + gw sample collected 11/1/96

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No X Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G12
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading: Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND vfg		AGP-SG-G12-02				
							TD - 2.0						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-613
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	↓	↓	↓										
	2.5						SAND, vfg		AGP-SG-613-02				
GW	6.5	↓	↓				SAND, vfg. lt br		AGP-GW-613				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Advanced to 6.5' & gw sample collected on 11/1/96

Drilling Area Background (ppm): 0

Converted to Well: Yes ____ No X

Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: T&G
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G14
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
NA	0	NA	NA										
SG	2						SAND		AGP-SG-G14-02		0		0
							TD 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [   ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G15
DATE: 10/29/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG	2						SAND, Fill		AGP-SG-G15-02				
							TD 2'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G16
DATE: 10/29/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G16-02				
							TD-2.0						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MC RD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G17
DATE: 10/29/96
GEOLOGIST: J. Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	N.A										
SG	2						SAND		AGP-SB-G17-02				
							~~FD 2.0~~						
GW	5						SAND, f.g. gray		AGP-GW-G17				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole advanced to 5' + gw sample collected on 1/11/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-618
DATE: 10/29/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-618-02				
							TD 2.0						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G19
DATE: 10/29/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G19-02				
							TD 2						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G20
DATE: 10/29/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G20-02	0	0	8	0
							~~TD 2.0~~ JWH						
GW	6.5						SAND, vfg,		AGP-GW-G20				
							TD - 6.5						

* When rock coring, enter rock brokenness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole pushed to 6.5' + gw sample collected on 11/1/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-621
DATE: 10/29/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-621-02				
							TD 2.0						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is

PROJECT NUMBER: 7387

DRILLING COMPANY: TEG

DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-622

DATE: 10/29/96

GEOLOGIST: Hofer

DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-622-02				
							TD 2.0						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ____________________

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G24
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
1 SG	0 - 2	NA	NA				SAND		AGP-SG-G24-02	NA	0	62.8	0
							TD - 2.0						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ____________________

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G25
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G25-02	NA			

* When rock coring, enter rock brokeness.
** Include monitor reading in 5 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-626
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G26-02				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G27
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G27-02				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #:

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-628
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND, vfg		AGP-~~628~~ SG-628-02				
GW	6.5						TD 6.5		AGP-GW-628				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Advanced to 6.5' + gw sample collected 11/1/96

Drilling Area Background (ppm): 0

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-629
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND, Fill?		AGP-SG-629-02				
GW	6.5						TD 6.5		AGP-GW-629				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole pushed to 6.5' gw sampled on 11/1/96

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Prob

BORING NUMBER: AGP-G30
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG							SAND						
	2.5						TD - 2.5'		AGP-SG-630-02				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #:

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV-Hydraulic Probe

BORING NUMBER: AGP-G31
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				FILL						
SG	2						SAND		AGP-SG-G31-02				
GW	5						SAND		AGP-GW-G31				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Advanced to 5' & gw sample Collected 10/31/96

Drilling Area Background (ppm):

Converted to Well: Yes ____ No X

Well I.D. #:

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV, Hydraulic Probe

BORING NUMBER: AGP-632
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-632-02				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G33
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA				Asphalt + gravel						
SG	2						SAND		AGP-SG-G33-02				
	5						SAND		AGP-GW-G33				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Advance to 5' + gw sample collected on 10/31/96

Drilling Area Background (ppm): [C]

Converted to Well: Yes ______ No X
Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G34
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA				FILL						
SG	2						SAND		AGP-SG-G34-02				
							~~FD 2.0~~ JWH 10/31/96						
GW	5						SAND		AGP-GW-G34				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole advanced to 5 ft + ~~g~~ gw sample Collect 10/31/96

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G35
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G35-02				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7287
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGS-G36
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDaniels

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete -0-.5' FILL						
SG	1.5								AGP-SG-G36-02	NA	0		0
GW	5.0						SAND, vfg, gray		AGP-GW-G36				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Advanced 1.5 to 5.0 + gw sampled on 10/31/96

Drilling Area Background (ppm): [0]

Converted to Well: Yes ____ No X Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV, Hydraulic Probe

BORING NUMBER: AGP-G37
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete, 4"						
SG	1.8						FILL 1.3' SAND		AGP-SG-G37-02	NA	0	8.5	0
							~~TD 1.8'~~						
	5						SAND		AGP-GW-G37				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole advanced to 5 ft and gw sample collected 10/31/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G38
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete 0-4" FILL						
SG	1.5						SAND		AGP-SG-G38-02	NA	0	2.6	0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #:

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G39
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA				Concrete 0-4" FILL 4"-1'		AGP-SG-G39-01		0	2.4	0
SG	1.1						SAND?						
	4.5						SAND, vfg, gray		AGP-GW-G39				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole advanced to 4.5 & gw sample collected 10/31/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G40
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete 0-4" FILL		AGP-SG-G40-01	NA	0	2.6	0
SG	1.2												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G41
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete 0-4" FILL		AGP-SG-G41-01		0	2.6	0
SG	1.2												
							SAND						
GW	4.5								AGP-GW-G41				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Hole advanced to 4.5' 10/31/96
GW sample collected 10/31/96

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No X

Well I.D. #:

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G42
DATE: 10/30/96
GEOLOGIST: Hofer
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SG	0 1½	NA	NA				Concrete 0-4" FILL		AGP-SG-G42-01	NA	0	2.5	0

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is

PROJECT NUMBER: 7387

DRILLING COMPANY: TEG

DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G44

DATE: 10/31/96

GEOLOGIST: Hofer

DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA				Concrete FILL			NA	0	0	0
SG	1.5								AGP-SG-G44-01				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV - Hydraulic Probe

BORING NUMBER: AGP-G45
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete FILL		AGP-SG-G45-01	NA	0		0
SG	1.5												
~~GW~~	1.5 3.0						SAND		~~AGP-GW-G45~~				
									AGP-GW-G45				
GW	4.5												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-646
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1 SG	0 - 1.5	NA	NA				FILL		AGP-SG-646-01	NA	0		0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV - Hydraulic Probe

BORING NUMBER: AGP-G47
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				FILL						
SG	1.5						SAND		AGP-SG-G47-01	NA	0	0	0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G48
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	1.9						SAND		AGP-SG-G48-00	NA	0		0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-649
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA				FILL						
SG	1.7	↓	↓				SAND		AGP-SG-649-02	NA	0		0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G50
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA										
SG	1.5						SAND		AGP-SG-G50-02	NA	0		0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG:

BORING NUMBER: AGP-GS1
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SG	0 – 1.2	NA	NA				Concrete 0-4" FILL 4"-12"		AGP-SG-GS1-01	NA	0	27.0	0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe

BORING NUMBER: AGP-G52
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA				Concrete 0-4" FILL		AGP-SG-G52-01	NA	0	0	0
SG	1.2												
GW	4.5						SAND		AGP-GW-G52				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G53
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G53-02	NA	0	0	0

* When rock coring, enter rock brokeness.

** Include monitor reading in 5 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G54
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0	NA	NA										
SG	2						SAND		AGP-SG-G54-02	NA	0	2.7	0

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD- Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV-Hydraulic Probe

BORING NUMBER: AGP-GS5
DATE: 10/31/96
GEOLOGIST: Hofer
DRILLER: Wood

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
	0	NA	NA				FILL						
SG	1.12	0	6						~~SA~~GP-SG-GS5-01		0		0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ____ Well I.D. #:

Page 1 of 1

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G56
DATE: 11/1/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		NA	NA				FILL						
							SAND						
GW	6.5								AGP-GW-G56				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ____________________

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: MCRD, Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: TEG
DRILLING RIG: ATV Hydraulic Probe
BORING NUMBER: AGP-G57
DATE: 11/1/96
GEOLOGIST: Hofer
DRILLER: McDanial

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
0	0	NA	NA										
6.5 GW	6.5						SAND, vfg		AGP-GW-G57				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes ____ No ____ Well I.D. #: ____

APPENDIX D

MONITORING WELL BORING LOGS AND COMPLETION FORMS

Page 1 of 1

BORING LOG

PROJECT NAME: Parris Is AVGAS Pipeline
PROJECT NUMBER: 7387
DRILLING COMPANY: AED
DRILLING RIG:

BORING NUMBER: PAI-MW001-
DATE: 11/12/96
GEOLOGIST: S. Hofer
DRILLER: M. King

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	U S C S *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SS 01	0	16/9	6/6				Asphalt - 0-6"		PAI-SU-MW01-01	5.1	0	0	0
↓	2	9/8	6/2				vfg sand fill lgt brown, silty						
SS 02	2	5/4	6/6				SAND, vfg, some		wet @ 2.5'	5.1	0	0	0
↓	4	4/4	6/0				silt, lgt brown						
SS 03	8	5/5	6/0				SAND, white, vfg		SATURATED		0	0	0
↓	10	4/3	0/0										
							TD - 13.5'						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): 0

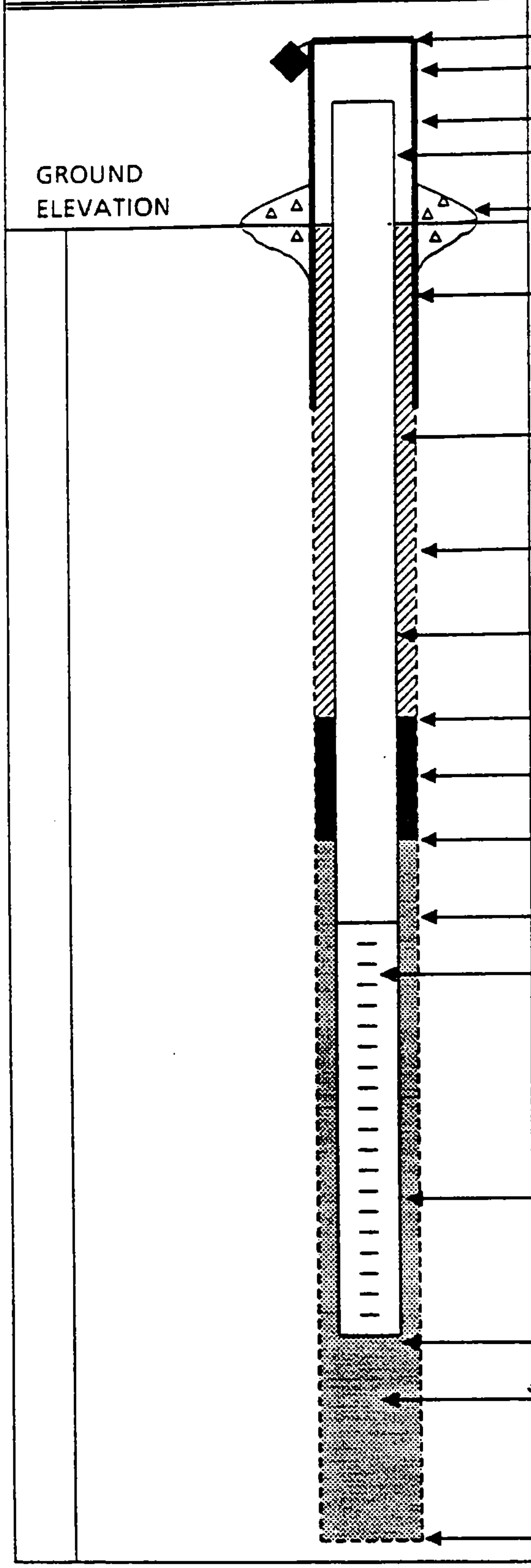
Converted to Well: Yes X No

Well I.D. #: PAI-MW001

BORING NO.: PAI-MW001

OVERBURDEN
MONITORING WELL SHEET

PROJECT Parris Is AVGAS	LOCATION AVGAS Transfer	DRILLER M. King
PROJECT NO. 7387	BORING PAI-MW001	DRILLING METHOD HSA
ELEVATION	DATE 11/12/96	DEVELOPMENT METHOD
FIELD GEOLOGIST J. Hofer		



ELEVATION OF TOP OF SURFACE CASING :

ELEVATION OF TOP OF RISER PIPE:

STICK - UP TOP OF SURFACE CASING:

STICK - UP RISER PIPE :

TYPE OF SURFACE SEAL: concrete

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: steel

RISER PIPE I.D. 2"

TYPE OF RISER PIPE: Sch 40 PVC

BOREHOLE DIAMETER: 7 1/4

TYPE OF BACKFILL: cement/bentonite grout

ELEVATION / DEPTH TOP OF SEAL: 10.5'

TYPE OF SEAL: Bentonite pellets

DEPTH TOP OF SAND PACK: 11.5

ELEVATION / DEPTH TOP OF SCREEN: 12.0

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.01, 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/40

ELEVATION / DEPTH BOTTOM OF SCREEN: 112.0

ELEVATION / DEPTH BOTTOM OF SAND PACK: 113

TYPE OF BACKFILL BELOW OBSERVATION WELL: Sand

ELEVATION / DEPTH OF HOLE: 113.5

BORING LOG

PROJECT NAME: Parris Is
PROJECT NUMBER: 7387
DRILLING COMPANY: AED
DRILLING RIG: CME ATV

BORING NUMBER: PAI-MW002
DATE: 11/12/96
GEOLOGIST: J. Hofer
DRILLER: M. King

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SS 01	0	5 / 4	12				SAND, silty, vfg,		PAI-MW-002-01	0.2	0	0	0
51	2	4 / 4	3				dk gray - brown						
SS 02	2	5 / 4	12						wet @ 2.5'	0.3	0	0	0
1	4	5 / 7	6										
SS 03	8	4 / 4					SAND, vfg, lgt gray				0	0	0
10	10	4 / 5					to reddish yellow						
							TD - 13.5'						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

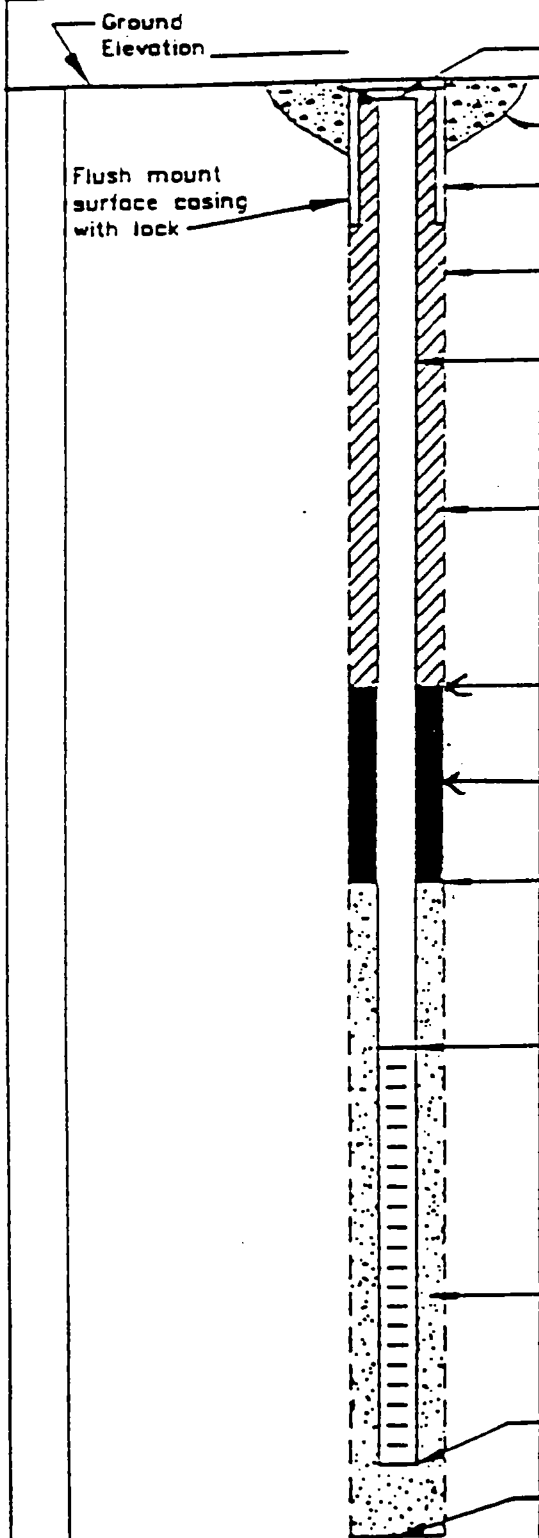
Drilling Area Background (ppm):

Converted to Well: Yes X No

Well I.D. #:

MONITORING WELL SHEET

PROJECT Parris Is	LOCATION Avgas Pipeline	DRILLER M. King
PROJECT NO. 7387	BORING PAI-MW02	DRILLING METHOD HSA
ELEVATION	DATE	DEVELOPMENT METHOD ~~Air~~ pumping
FIELD GEOLOGIST J. Hofer		



ELEVATION TOP OF RISER:

TYPE OF SURFACE SEAL: Concrete

TYPE OF PROTECTIVE CASING: Aluminum / steel

I.D. OF PROTECTIVE CASING: 8"

DIAMETER OF HOLE: 7 1/4

TYPE OF RISER PIPE: Sch 40 PVC

RISER PIPE I.D.: 2"

TYPE OF BACKFILL/SEAL: NA

Top of seal 0.5 ft BGS

Bentonite pellet seal

DEPTH/ELEVATION TOP OF SAND: 1.5 /

DEPTH/ELEVATION TOP OF SCREEN: 2.8 /

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.01, 10'

TYPE OF SAND PACK: 20/40 silica sand

DIAMETER OF HOLE IN BEDROCK: NA

DEPTH/ELEVATION BOTTOM OF SCREEN: /12.8

DEPTH/ELEVATION BOTTOM OF SAND: /13.5

DEPTH/ELEVATION BOTTOM OF HOLE: /13-5

BACKFILL MATERIAL BELOW SAND:

BORING LOG

PROJECT NAME: Parris Is AVGAS
PROJECT NUMBER: 7387
DRILLING COMPANY: AED
DRILLING RIG: CME ATV
BORING NUMBER: PAI-MW-003
DATE: 11/12/96
GEOLOGIST: J. Hofer
DRILLER: M. King

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**
SS 01	0	4 / 6	12				Top Soil, silty sand, v. dark gray			4.8	0		0
|	2	8 / 9	9				SAND, vfg, red yel to						
SS 02	2	4 / 3	12				dk olive gray		wet @ 3'	0.2	0		0
|	4	4 / 7	5				lgt olive gray to red yellow						
SS 03	8	4 / 3					SAND, lgt olive gray,			0	0	0.5	0
|	10	2 / 2					vfg						
							TD - 14.0'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes X No

Well I.D. #: PAI-MW003

BORING NO.: ____________

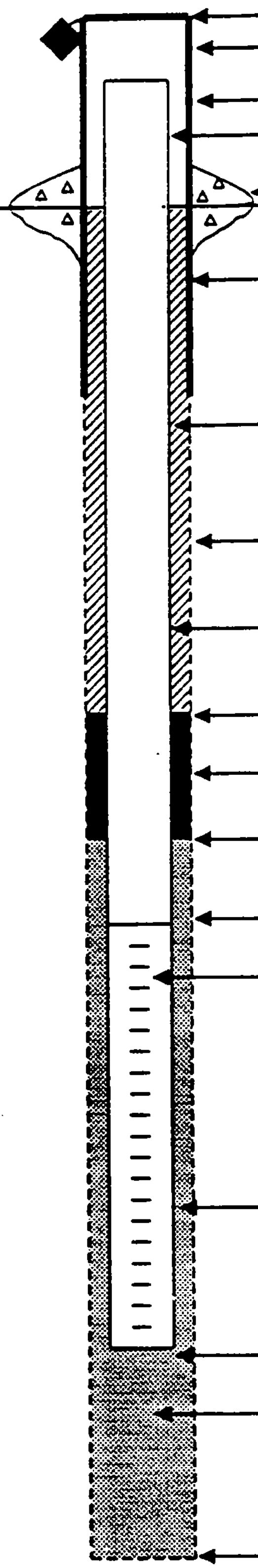
OVERBURDEN MONITORING WELL SHEET

PROJECT Parris Is
PROJECT NO. 7387
ELEVATION ____________
FIELD GEOLOGIST J. Hofer

LOCATION AVGAS Pipeline
BORING PAI-MW03
DATE 11/12/96

DRILLER M. King
DRILLING METHOD HSA
DEVELOPMENT METHOD pump

GROUND ELEVATION



ELEVATION OF TOP OF SURFACE CASING: ____________
ELEVATION OF TOP OF RISER PIPE: ____________
STICK - UP TOP OF SURFACE CASING: ____________
STICK - UP RISER PIPE: 2.59
TYPE OF SURFACE SEAL: Concrete
I.D. OF SURFACE CASING: 4"
TYPE OF SURFACE CASING: steel
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: Sch 40 PVC
BOREHOLE DIAMETER: 7 1/4
TYPE OF BACKFILL: NA
ELEVATION / DEPTH TOP OF SEAL: 10.5
TYPE OF SEAL: bentonite pellets
DEPTH TOP OF SAND PACK: 11.5
ELEVATION / DEPTH TOP OF SCREEN: 13.0
TYPE OF SCREEN: Sch 40 PVC
SLOT SIZE x LENGTH: 0.01 , 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: 20/40 Silica Sand , 5 bags - 50lbs ea
ELEVATION / DEPTH BOTTOM OF SCREEN: 113.0
ELEVATION / DEPTH BOTTOM OF SAND PACK: 113.
TYPE OF BACKFILL BELOW OBSERVATION WELL: Natural material
ELEVATION / DEPTH OF HOLE: 114.0

BORING LOG

PROJECT NAME: Parris Is AVGAS Pipeline
PROJECT NUMBER: 7387
DRILLING COMPANY: AED
DRILLING RIG: CME 750 ATV
BORING NUMBER: PAI-MW04
DATE: 11/13/96
GEOLOGIST: J. Hofer
DRILLER: M. King

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SS 01	0	8/9	12	SM			FILL - 0-1' SAND, vfg, silty						
	2	9/11	8		med dens		dk grayish brown		PAI-SV-MW04-01 PAI-DP-MW04-01	104	0	0	0
SS 02	2	9/9	12										
	4	8/9	4						SATURATED				
SS 03	4	3/4	11	SP	loose		SAND, some silt,		strong petro	696	0	0	0
	6	6/9	0		med dense		lgt olive gray		odor				
SS 04	6	6/8	12							438	0	0	0
	8	8/8	4										
SS 05	8	5/3	12		loose					116	0	0	0
	10	3/2	2										
SS 06	10	3/3											
	12	4/5											
SS 07	12	3/3	12				SAND, vfg, gray -		sl. odor	43.1	0	0	0
	14	4/5	2				dk gray						
SS 08	14	3/1	12	SC	very loose		SAND, fine grained-vfg		no odor	0.5	0	0	0
	16	1/1	10				some clay, dk gray-bluish gray						
SS 09	16	1/0	12							8.6	0	0	0
	18	0/1	12										
SS 10		1/1	12								0	0	0
	20	1/3	10	CL	soft		CLAY, trace vfg sand dk olive gray						
SS 11		4/3	0	SP	loose		SAND, fine-vfg		Super sat.				
	22	4/4	0				(No recovery)		(running sand)				
SS 12		3/1	12	CL SC			Interbedded CLAY + SAND - 6" Thick						
	24	1/2	4	CL									
SS 13	25	5/5			stiff		CLAY, olive green		moist - sl. moist				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: Well installed by mud rotary

Drilling Area Background (ppm):

Converted to Well: Yes ______ No ______ Well I.D. #: ______

BORING LOG

PROJECT NAME: Parris Is AVGAS
PROJECT NUMBER: 7387
DRILLING COMPANY: AED
DRILLING RIG: CME 750 ATV
BORING NUMBER: PAI-MW04
DATE: 11/13/96
GEOLOGIST: J. Nofer
DRILLER: M. King

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
SS 13	26	7 / 21					SAND, clayey, dk olive green		Moist				
							TD - 26'						

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm):

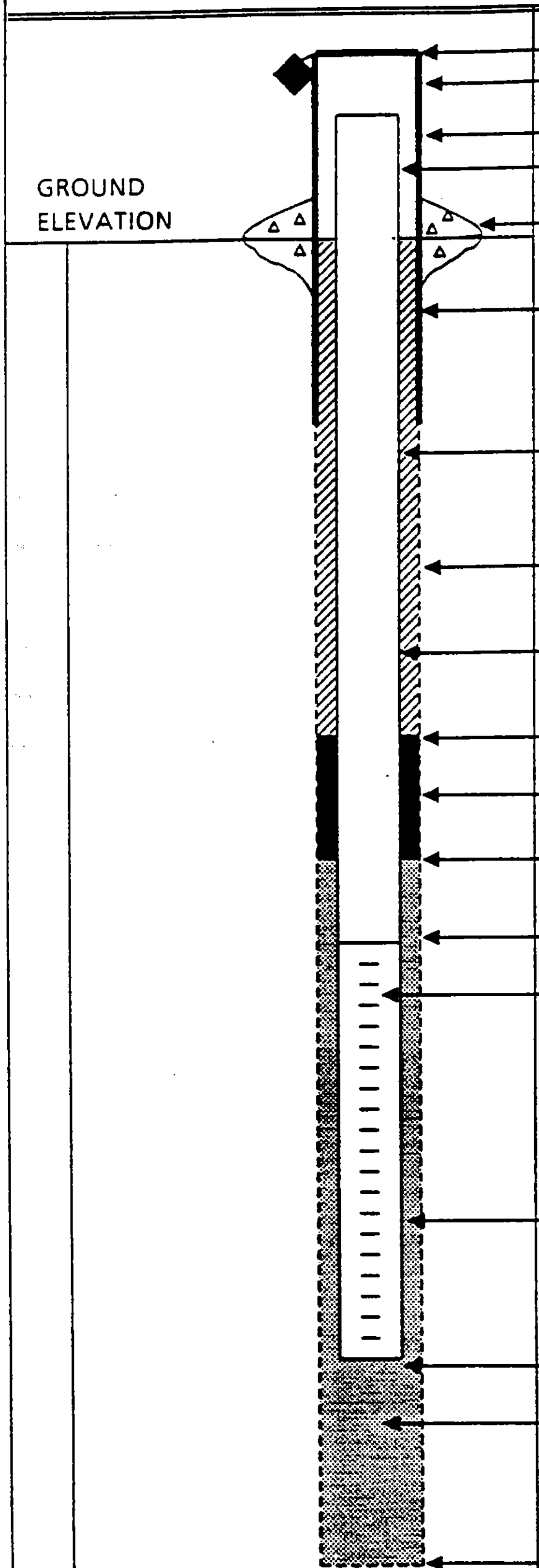
Converted to Well: Yes X No

Well I.D. #: PAI-MW04

BORING NO.: MW04

OVERBURDEN
MONITORING WELL SHEET

PROJECT Parris Is	LOCATION AVGAS Pipeline	DRILLER M. King
PROJECT NO. 7387	BORING PAI-MW04	DRILLING METHOD Mud rotary
ELEVATION	DATE	DEVELOPMENT METHOD rig pump
FIELD GEOLOGIST J. Hofer		



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK - UP TOP OF SURFACE CASING:

STICK - UP RISER PIPE: 2.68

TYPE OF SURFACE SEAL: concrete

I.D. OF SURFACE CASING: 4"

TYPE OF SURFACE CASING: steel

RISER PIPE I.D. 2"

TYPE OF RISER PIPE: Sch 40 PVC

BOREHOLE DIAMETER: 7 1/4

TYPE OF BACKFILL: bent/cement grout

ELEVATION / DEPTH TOP OF SEAL: 114.0

TYPE OF SEAL: Bentonite pellets

DEPTH TOP OF SAND PACK: 16.0

ELEVATION / DEPTH TOP OF SCREEN: 118.0

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.01, 5'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/40 silica sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 123.0

ELEVATION / DEPTH BOTTOM OF SAND PACK: 126.0

TYPE OF BACKFILL BELOW OBSERVATION WELL: Sand pack

ELEVATION / DEPTH OF HOLE: 126.0

BORING LOG

PROJECT NAME: Parris Is ANGAS
PROJECT NUMBER: 7387
DRILLING COMPANY: AGD
DRILLING RIG: CME ATV

BORING NUMBER: PAI-MW005
DATE: 11/13/96
GEOLOGIST: J. Hofer
DRILLER: M. King

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SS 01	0 1	5 / 7	12				Top Soil 0-6"		PAI-SU-005-01	0.6	0	0	0
~~SS 02~~	2	8 / 11	6				SAND, silty, vfg lgt olive gray - red yellow		PAI-DP-005-01		0		0
SS 02	2	8 / 8	12						Wet @ 3'	0.1	0	0	0
	4	9 / 7	4										
SS 03	8	4 / 3					SAND, vfg, lgt gray		SAT	0.5	0	18.0	0
	10	2 / 3											
							TD 13.5'			NA	0	8.0	0

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): [

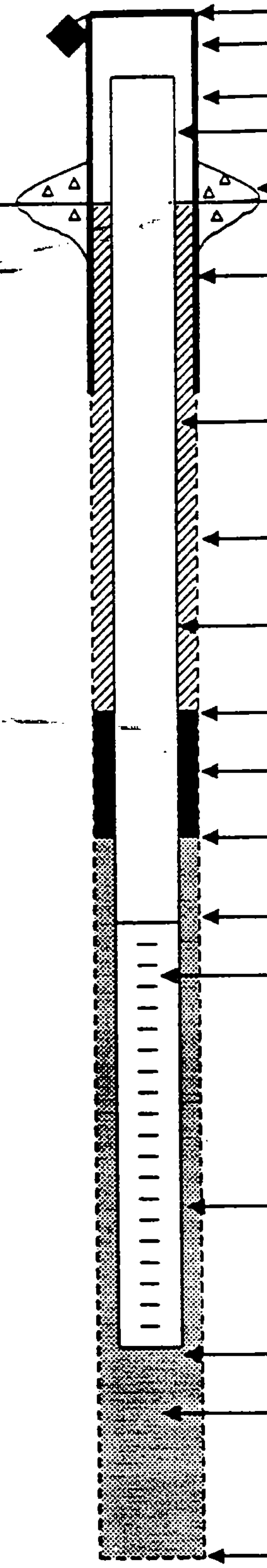
Converted to Well: Yes X No ___ Well I.D. #: ___

BORING NO.: MW05

OVERBURDEN
MONITORING WELL SHEET

PROJECT Parris Is	LOCATION AVGAS Pipeline	DRILLER M. King
PROJECT NO. 7387	BORING PAI-MW05	DRILLING METHOD HSA
ELEVATION	DATE 11/13/96	DEVELOPMENT METHOD Pump
FIELD GEOLOGIST J. Hofer		

GROUND ELEVATION



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK - UP TOP OF SURFACE CASING:

STICK - UP RISER PIPE:

TYPE OF SURFACE SEAL: Concrete

I.D. OF SURFACE CASING: 4"

TYPE OF SURFACE CASING: Steel

RISER PIPE I.D. 2"

TYPE OF RISER PIPE: Sch 40 PVC

BOREHOLE DIAMETER: 7 1/4

TYPE OF BACKFILL: NA

ELEVATION / DEPTH TOP OF SEAL: 10.5

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 11.5

ELEVATION / DEPTH TOP OF SCREEN: 12.12

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.01, 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/40 Silica Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: 112.12

ELEVATION / DEPTH BOTTOM OF SAND PACK: 113.5

TYPE OF BACKFILL BELOW OBSERVATION WELL:

ELEVATION / DEPTH OF HOLE: 113.5

BORING LOG

PROJECT NAME: Parris Is AVGAS
PROJECT NUMBER: 7387
DRILLING COMPANY: AED
DRILLING RIG: CME ATV

BORING NUMBER: PAI-MW006
DATE: 11/12/96
GEOLOGIST: J Hoter
DRILLER: M King

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
SS 01	0	4/5	12			Bk	Top soil 0-6" SAND, vfg.			0.4	0	0	0
|	2	6/6	8			lt gr red-yel			moist				
SS 02	2	4/2	12			red-yel-	SAND, vfg.		PAI-SV-006-02	0.2	0	0	0
|	4	3/3	6			lgt olive gray	Iron concretions		moist - vy moist				
SS 03	4	3/3							SAT	NA	0	0	0
|	6	4/5											
SS	9	3/3	12			lgt olive gray	SAND, vfg			0.2	0	0	0
04	11	2/3	8										
							TD - 14.0'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: ______

Drilling Area Background (ppm): [ ]

Converted to Well: Yes X No ______ Well I.D. #: ______

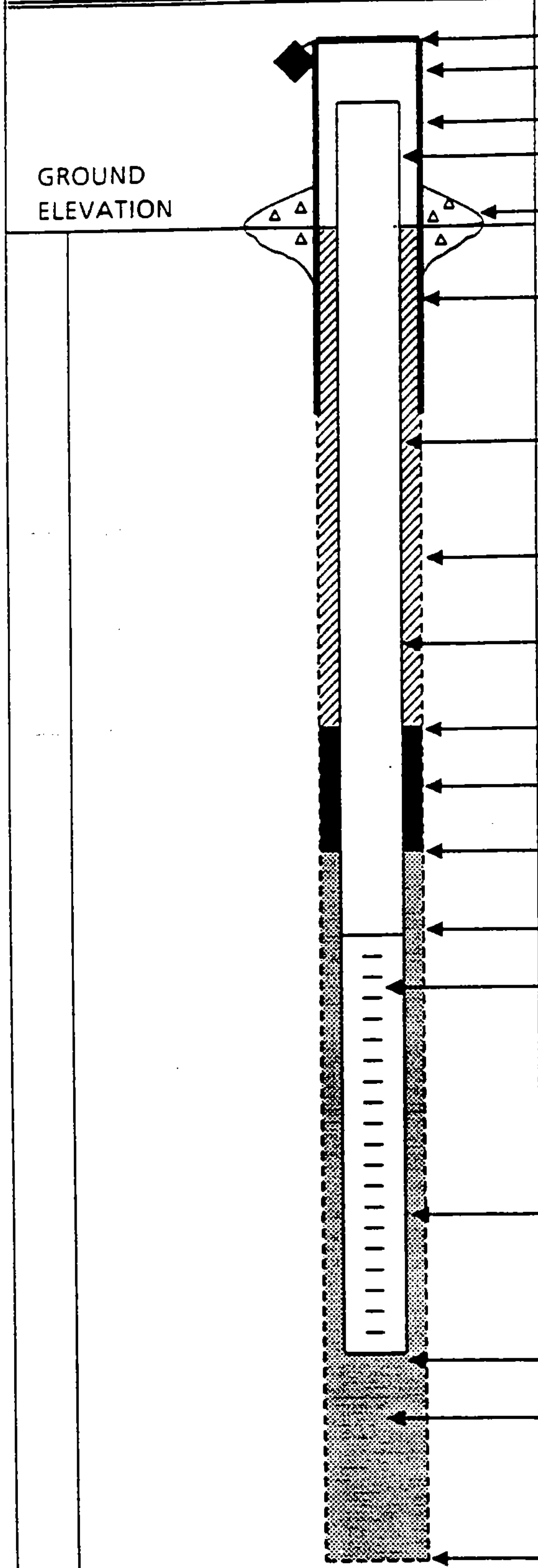
BORING NO.: MW06

OVERBURDEN MONITORING WELL SHEET

PROJECT Parris Is
PROJECT NO. 7387
ELEVATION
FIELD GEOLOGIST J. Hofer

LOCATION AVGAS Pipeline
BORING PAI-MW06
DATE 11/12/96

DRILLER M. King
DRILLING METHOD HSA
DEVELOPMENT METHOD pump



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK - UP TOP OF SURFACE CASING:

STICK - UP RISER PIPE: 2.55

TYPE OF SURFACE SEAL: Concrete

I.D. OF SURFACE CASING: 4"

TYPE OF SURFACE CASING: Steel

RISER PIPE I.D. 2"

TYPE OF RISER PIPE: Sch 40 PVC

BOREHOLE DIAMETER: 7 1/4"

TYPE OF BACKFILL: NA

ELEVATION / DEPTH TOP OF SEAL: /0.5

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 1.5

ELEVATION / DEPTH TOP OF SCREEN: /3.17

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.01, 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/40 Silica Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: /13.17

ELEVATION / DEPTH BOTTOM OF SAND PACK: /14.0

TYPE OF BACKFILL BELOW OBSERVATION WELL:

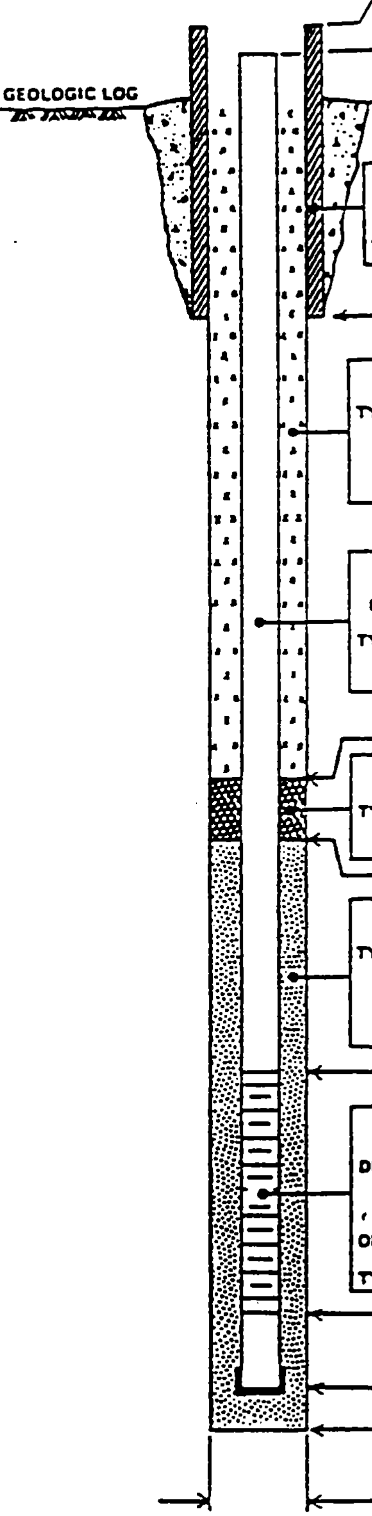
ELEVATION / DEPTH OF HOLE: /14.0

MONITORING WELL

PROJECT	WELL NO
Parris Island - AVGAS Pipeline	

JOB NO	SITE	COORDINATES
22567-141	Yorktown Blvd	

BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
4/11/95	4/11/95	D. Linby	



	DEPTH	ELEV.
ELEV. – TOP OF SURFACE CASING:		
ELEV. – TOP OF RISER CASING:	+3.5'	
GROUND SURFACE		
BOTTOM OF SURFACE CASING	1.5'	
TOP OF SEAL	1'	
TOP OF FILTER PACK	2'	
TOP OF SCREEN	2.5'	
BOTTOM OF SCREEN	17.5	
BOTTOM OF SUMP	19.5'	
BOTTOM OF HOLE	22	

GENERALIZED GEOLOGIC LOG

SURFACE CASING
DIA: 4-inch x 5 ft
TYPE: Steel locking monument

BACKFILL MATERIAL
TYPE: Bentonite

RISER CASING
DIA: 2-inch
TYPE: Fl Thread Sch 40 PVC

ANNULAR SEAL
TYPE: Bentonite Pellets

FILTER PACK
TYPE: FX 50 QTZ SAND

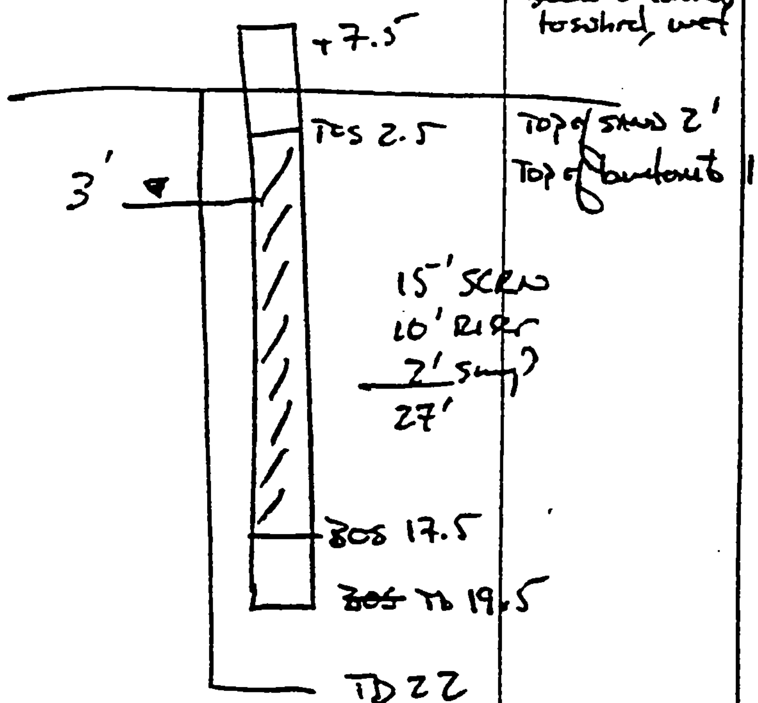
SCREEN:
DIA: 2-inch TYPE: PVC, Sch 40
OPENINGS: WIDTH: 0.010
TYPE: FAC. SLOT

HOLE DIA: 8-inch

GEOLOGIC DRILL LOG

Project	Parris Is
Job No.	
Sheet No.	1 of 1
Hole No.	
Site	Yorktown Blvd.
Coordinates	TBD
Angle from Horiz.	90°
Bearing	—
Begun	4/11/95
Completed	4/11/95
Driller	T. Brounson
Drill Make and Model	CME 55
Hole Size	8"
Overburden (Ft.)	—
Rock (Ft.)	—
Total Depth	22 ft
Core Recovery (Ft./%)	—
Core Boxes	—
Samples	—
El. Top of Casing	
Ground El.	
Depth/El. Ground Water	3 ft
Depth/El. Top of Rock	—
Sample Hammer Weight/Fall	—
Casing Left in Hole: Dia./Length	2" / 25 ft.
Logged By	D. Linley

Sampler Type and Diameter	Sampler Advance / Length Core Run	Sample Recovery / Core Recovery	Sample Blows /6"	Percent Core Recovery	Water Pressure Tests: Loss in G.P.M.	Pressure P.S.I.	Time in Minutes	Elevation	Depth	Graphic Log	Sample	Description and Classification	Notes on: Water Levels, Water Return, Character of Drilling, etc.
												0–7 SAND: Pale yel org (10YR 8/6) v fine, unconsld, mod sort, subang to subrd. 7–13 SAND: v pale org (10YR 8/2), v fine, unconsld, mod sort, subang to subrd, wet, HC odor. @ 13 ft BGL H_2O flow out of boring – sheen on H_2O. 13–22 SAND: yel gry (5Y 7/2), v fine unconsld, mod sort, subang to subrd saturated! TD @ 22 ft BGL H_2O @ 3 ft BGL	17–22' silty clay: med blu gry (5B 5/1), v fine, ~~mod poor sort~~, ~~semi-consld~~, subang to subrd, wet



SS – Split Spoon; ST – Shelby Tube; D – Denison; P – Pitcher; O – Other

Site: Yorktown Blvd – AVGAS Pipeline

Hole No.:

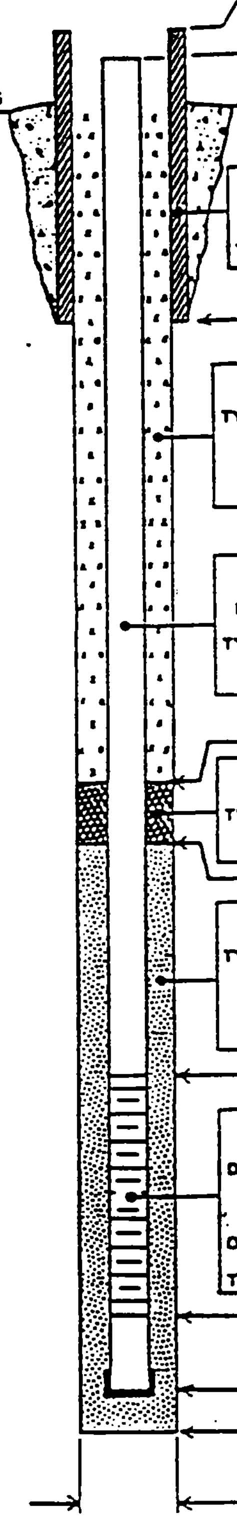
MACF 19-1

MONITORING WELL

PROJECT	WELL NO.
Parris Island - AVGAS Pipeline	

JOB NO.	SITE	COORDINATES
22567-141	Henderson Str	

BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
4/11/95	4/11/95	P. Lingy	



GENERALIZED GEOLOGIC LOG

	DEPTH	ELEV.
ELEV. – TOP OF SURFACE CASING:		
ELEV. – TOP OF RISER CASING:	+4'	
GROUND SURFACE		
BOTTOM OF SURFACE CASING	1'	
TOP OF SEAL	1'	
TOP OF FILTER PACK	2'	
TOP OF SCREEN	2.5'	
BOTTOM OF SCREEN	17.5'	
BOTTOM OF SUMP	19.5	
BOTTOM OF HOLE	22'	

SURFACE CASING
DIA: 4-inch x 5ft.
TYPE: Steel locking monument

BACKFILL MATERIAL
TYPE: Bentonite

RISER CASING
DIA: 2-inch
TYPE: FL thread Sch 40 PVC

ANNULAR SEAL
TYPE: Bentonite Pellets

FILTER PACK
TYPE: FX 50 QTZ Sand

SCREEN:
DIA: 2-inch TYPE: PVC, Sch 40
OPENINGS: WIDTH: 0.010
TYPE: FAC slot

HOLE DIA.: 8-inch

BECHTEL

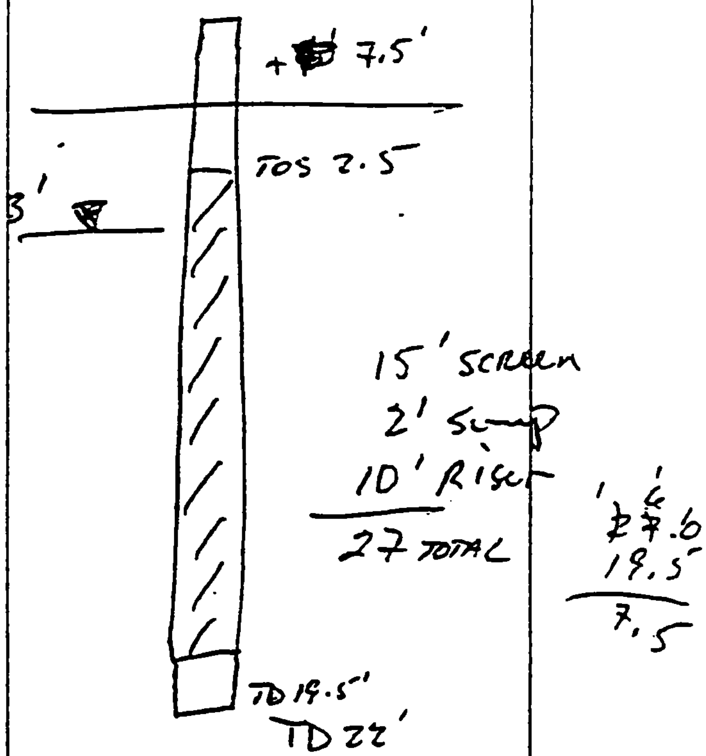
GEOLOGIC DRILL LOG

PROJECT	Parris Is
JOB NO.	
SHEET NO.	1 - 1
HOLE NO.	
SITE	Henderson Ste
COORDINATES	
ANGLE FROM HORIZ.	
BEARING	
BEGUN	4/11/95
COMPLETED	4/11/95
DRILLER	T. Brounson
DRILL MAKE AND MODEL	CME 55
HOLE SIZE	8"
OVERBURDEN (FT.)	—
ROCK (FT.)	—
TOTAL DEPTH	22 ft
CORE RECOVERY (FT./%)	—
CORE BOXES	—
SAMPLES	—
EL. TOP OF CASING	
GROUND EL.	
DEPTH/EL. GROUND WATER	3 ft
DEPTH/EL. TOP OF ROCK	—
SAMPLE HAMMER WEIGHT/FALL	N/A
CASING LEFT IN HOLE: DIA./LENGTH	2" / 22 ft.
LOGGED BY	P. Lingy

SAMPLER TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	SAMPLE BLOWS "N"	PERCENT CORE RECOVERY	WATER PRESSURE TESTS: LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
												0-22 SAND: Dusky yel (5Y6/4) vf-m, unconsol, mod sort, subang to subrd, wet @ 3 ft BGL	

TD @ 22 ft BGL

H_2O @ 3 ft BGL



SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: Henderson Ste - AVGAS Pipeline

HOLE NO.:

H&CF 19-1

APPENDIX E

SOIL ANALYTICAL RESULTS

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0101

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317S

Matrix: (soil/water) SOIL   Lab Sample ID: 9611317-01

Sample wt/vol: 20.0 (g/mL) g   Lab File ID: 2J707

Level: (low/med) LOW   Date Received: 11/14/96

% Moisture: not dec. 9   Date Analyzed: 11/24/96

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(ml)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.2	U
79-01-6	trichloroethene	2.2	U
71-43-2	benzene	2.2	U
108-88-3	toluene	0.30	J
108-90-7	chlorobenzene	2.2	U
100-41-4	ethylbenzene	0.25	J
1330-20-7	xylenes (total)	0.80	J
1634-04-4	methyl tert-butyl ether	2.2	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0101

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code:NA Case No.:NA SAS No.:NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-01

Sample wt/vol: 30.9 (g/mL) g Lab File ID: 4U509

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: 9 decanted: (Y/N) N Date Extracted:11/21/96

Concentrated Extract Volume: 1(mL) Date Analyzed: 11/22/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	356	U
209-96-8	acenaphthylene	356	U
83-32-9	acenaphthene	356	U
86-73-7	fluorene	356	U
85-01-8	phenanthrene	356	U
120-12-7	anthracene	356	U
206-44-0	fluoranthene	356	U
129-00-0	pyrene	356	U
56-55-3	benzo(a)anthracene	356	U
218-01-9	chrysene	356	U
205-99-2	benzo(b)fluoranthene	356	U
207-08-9	benzo(k)fluoranthene	356	U
50-32-8	benzo(a)pyrene	356	U
193-39-5	indeno(1,2,3-cd)pyrene	356	U
53-70-3	dibenz(a,h)anthracene	356	U
191-24-2	benzo(g,h,i)perylene	356	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0101

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317S

Matrix: (soil/water) SOIL   Lab Sample ID: 9611317-01

Sample wt/vol: 10.0 (g/mL) g   Lab File ID: A1J37

Level: (low/med) LOW   Date Received: 11/14/96

% Moisture: not dec. 9   Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
	----------------TPH - Volatile Fraction_____	54.9	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0101

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-01

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J37

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 9 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction	54.9	U

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAISVMW0101

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: _______ Case No.: _______ SAS No.: _______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-01

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: _91.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0			P

Color Before: _______ Clarity Before: _______ Texture: _______

Color After: _______ Clarity After: _______ Artifacts: _______

Comments:

FORM I - IN ILM03.0

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0201

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-02

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2J708

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 12 Date Analyzed: 11/24/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.3	U
79-01-6	trichloroethene	2.3	U
71-43-2	benzene	2.3	U
108-88-3	toluene	2.3	U
108-90-7	chlorobenzene	2.3	U
100-41-4	ethylbenzene	2.3	U
1330-20-7	xylenes (total)	4.5	U
1634-04-4	methyl tert-butyl ether	2.3	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0201

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code:NA Case No.:NA SAS No.:NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-02

Sample wt/vol: 31.0 (g/mL) g Lab File ID: 4U510

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: 12 decanted: (Y/N) N Date Extracted:11/21/96

Concentrated Extract Volume: 1(mL) Date Analyzed: 11/22/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	367	U
209-96-8	acenaphthylene	367	U
83-32-9	acenaphthene	367	U
86-73-7	fluorene	367	U
85-01-8	phenanthrene	367	U
120-12-7	anthracene	367	U
206-44-0	fluoranthene	367	U
129-00-0	pyrene	367	U
56-55-3	benzo(a)anthracene	367	U
218-01-9	chrysene	367	U
205-99-2	benzo(b)fluoranthene	367	U
207-08-9	benzo(k)fluoranthene	367	U
50-32-8	benzo(a)pyrene	367	U
193-39-5	indeno(1,2,3-cd)pyrene	367	U
53-70-3	dibenz(a,h)anthracene	367	U
191-24-2	benzo(g,h,i)perylene	367	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0201

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-02

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J38

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 12 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction	56.8	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0201

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317S

Matrix: (soil/water) SOIL   Lab Sample ID: 9611317-02

Sample wt/vol: 10.0 (g/mL) g   Lab File ID: A1J38

Level: (low/med) LOW   Date Received: 11/14/96

% Moisture: not dec. 12   Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction	56.8	U

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAISVMW0201

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: _______ Case No.: _______ SAS No.: _______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-02

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: _88.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	8.4			P

Color Before: __________ Clarity Before: ______ Texture: ______

Color After: __________ Clarity After: ______ Artifacts: ______

Comments:

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-03

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2J709

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 12 Date Analyzed: 11/24/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.3	U
79-01-6	trichloroethene	2.3	U
71-43-2	benzene	2.3	U
108-88-3	toluene	2.3	U
108-90-7	chlorobenzene	2.3	U
100-41-4	ethylbenzene	2.3	U
1330-20-7	xylenes (total)	4.5	U
1634-04-4	methyl tert-butyl ether	2.3	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0301RA

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-03

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2K104

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 12 Date Analyzed: 11/25/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.3	U
79-01-6	trichloroethene	2.3	U
71-43-2	benzene	2.3	U
108-88-3	toluene	2.3	U
108-90-7	chlorobenzene	2.3	U
100-41-4	ethylbenzene	2.3	U
1330-20-7	xylenes (total)	4.5	U
1634-04-4	methyl tert-butyl ether	2.3	U

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code:NA Case No.:NA SAS No.:NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-03

Sample wt/vol: 30.3 (g/mL) g Lab File ID: 4U511

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: 12 decanted: (Y/N) N Date Extracted:11/21/96

Concentrated Extract Volume: 1(mL) Date Analyzed: 11/22/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	375	U
209-96-8	acenaphthylene	375	U
83-32-9	acenaphthene	375	U
86-73-7	fluorene	375	U
85-01-8	phenanthrene	375	U
120-12-7	anthracene	375	U
206-44-0	fluoranthene	375	U
129-00-0	pyrene	375	U
56-55-3	benzo(a)anthracene	375	U
218-01-9	chrysene	375	U
205-99-2	benzo(b)fluoranthene	375	U
207-08-9	benzo(k)fluoranthene	375	U
50-32-8	benzo(a)pyrene	375	U
193-39-5	indeno(1,2,3-cd)pyrene	375	U
53-70-3	dibenz(a,h)anthracene	375	U
191-24-2	benzo(g,h,i)perylene	375	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-03

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J39

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 12 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction_____	56.8	U

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-03

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J39

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 12 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
	----------------TPH - Volatile Fraction_____	56.8	U

FORM I VOA

OLM03.0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAISVMW0301

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: _______ Case No.: _______ SAS No.: _______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-03

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: _88.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	6.2			P

Color Before: _______ Clarity Before: _______ Texture: _______

Color After: _______ Clarity After: _______ Artifacts: _______

Comments:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-10

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2J712

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 14 Date Analyzed: 11/24/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.3	U
79-01-6	trichloroethene	2.3	U
71-43-2	benzene	2.3	U
108-88-3	toluene	2.3	U
108-90-7	chlorobenzene	2.3	U
100-41-4	ethylbenzene	2.3	U
91-20-3	Naphthalene	1.2	U
1330-20-7	xylenes (total)	4.6	U
1634-04-4	methyl tert-butyl ether	2.3	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0401RA

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-10

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2K105

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 14 Date Analyzed: 11/25/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.3	U
79-01-6	trichloroethene	2.3	U
71-43-2	benzene	2.3	U
108-88-3	toluene	0.21	JB
108-90-7	chlorobenzene	2.3	U
100-41-4	ethylbenzene	2.3	U
91-20-3	Naphthalene	1.2	U
1330-20-7	xylenes (total)	4.6	U
1634-04-4	methyl tert-butyl ether	2.3	U

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-10

Sample wt/vol: 30.7 (g/mL) g Lab File ID: 4U517

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: 14 decanted: (Y/N) N Date Extracted: 11/21/96

Concentrated Extract Volume: 1 (mL) Date Analyzed: 11/22/96

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	379	U
209-96-8	acenaphthylene	379	U
83-32-9	acenaphthene	379	U
86-73-7	fluorene	379	U
85-01-8	phenanthrene	379	U
120-12-7	anthracene	379	U
206-44-0	fluoranthene	379	U
129-00-0	pyrene	379	U
56-55-3	benzo(a)anthracene	379	U
218-01-9	chrysene	379	U
205-99-2	benzo(b)fluoranthene	379	U
207-08-9	benzo(k)fluoranthene	379	U
50-32-8	benzo(a)pyrene	379	U
193-39-5	indeno(1,2,3-cd)pyrene	379	U
53-70-3	dibenz(a,h)anthracene	379	U
191-24-2	benzo(g,h,i)perylene	379	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-10

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J312

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 14 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction	4.7	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0401

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317S

Matrix: (soil/water) SOIL   Lab Sample ID: 9611317-10

Sample wt/vol: 10.0 (g/mL) g   Lab File ID: A1J312

Level: (low/med) LOW   Date Received: 11/14/96

% Moisture: not dec. 14   Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction_____	4.7	J

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAISVMW0401

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-10

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: _86.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	6.9			P

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW0401

ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-11

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2K106

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 14 Date Analyzed: 11/25/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.3	U
79-01-6	trichloroethene	2.3	U
71-43-2	benzene	2.3	U
108-88-3	toluene	2.3	U
108-90-7	chlorobenzene	2.3	U
100-41-4	ethylbenzene	2.3	U
91-20-3	Naphthalene	1.2	U
1330-20-7	xylenes (total)	4.6	U
1634-04-4	methyl tert-butyl ether	2.3	U

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code:NA Case No.:NA SAS No.:NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-11

Sample wt/vol: 30.2 (g/mL) g Lab File ID: 4U518

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: 14 decanted: (Y/N) N Date Extracted:11/21/96

Concentrated Extract Volume: 1(mL) Date Analyzed: 11/22/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	384	U
209-96-8	acenaphthylene	384	U
83-32-9	acenaphthene	384	U
86-73-7	fluorene	384	U
85-01-8	phenanthrene	384	U
120-12-7	anthracene	384	U
206-44-0	fluoranthene	384	U
129-00-0	pyrene	384	U
56-55-3	benzo(a)anthracene	384	U
218-01-9	chrysene	384	U
205-99-2	benzo(b)fluoranthene	384	U
207-08-9	benzo(k)fluoranthene	384	U
50-32-8	benzo(a)pyrene	384	U
193-39-5	indeno(1,2,3-cd)pyrene	384	U
53-70-3	dibenz(a,h)anthracene	384	U
191-24-2	benzo(g,h,i)perylene	384	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW0401

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317S

Matrix: (soil/water) SOIL   Lab Sample ID: 9611317-11

Sample wt/vol: 10.0 (g/mL) g   Lab File ID: A1J313

Level: (low/med) LOW   Date Received: 11/14/96

% Moisture: not dec. 14   Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
	----------------TPH - Volatile Fraction_____	53.9	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-11

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J313

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 14 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction_____	53.9	J

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIDPMW0401

La_ Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: _______ Case No.: _______ SAS No.: _______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-11

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: _86.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	7.4			P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0501

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317S

Matrix: (soil/water) SOIL   Lab Sample ID: 9611317-07

Sample wt/vol: 20.0 (g/mL) g   Lab File ID: 2J711

Level: (low/med) LOW   Date Received: 11/14/96

% Moisture: not dec. 14   Date Analyzed: 11/24/96

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(ml)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.3	U
79-01-6	trichloroethene	2.3	U
71-43-2	benzene	2.3	U
108-88-3	toluene	2.3	U
108-90-7	chlorobenzene	2.3	U
100-41-4	ethylbenzene	2.3	U
1330-20-7	xylenes (total)	4.6	U
1634-04-4	methyl tert-butyl ether	2.3	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0501

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code:NA Case No.:NA SAS No.:NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-07

Sample wt/vol: 30.2 (g/mL) g Lab File ID: 4U513

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: 14 decanted: (Y/N) N Date Extracted:11/21/96

Concentrated Extract Volume: 1(mL) Date Analyzed: 11/22/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	385	U
209-96-8	acenaphthylene	385	U
83-32-9	acenaphthene	385	U
86-73-7	fluorene	385	U
85-01-8	phenanthrene	385	U
120-12-7	anthracene	385	U
206-44-0	fluoranthene	385	U
129-00-0	pyrene	385	U
56-55-3	benzo(a)anthracene	385	U
218-01-9	chrysene	385	U
205-99-2	benzo(b)fluoranthene	385	U
207-08-9	benzo(k)fluoranthene	385	U
50-32-8	benzo(a)pyrene	385	U
193-39-5	indeno(1,2,3-cd)pyrene	385	U
53-70-3	dibenz(a,h)anthracene	385	U
191-24-2	benzo(g,h,i)perylene	385	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0501

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-07

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J311

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 14 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction_____	58.1	U

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0501

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-07

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J311

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 14 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction_____	58.1	U

FORM I VOA OLM03.0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAISVMW0501

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: _______ Case No.: _______ SAS No.: _______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-07

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: _86.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	5.5			P

Color Before: __________ Clarity Before: _______ Texture: _______

Color After: __________ Clarity After: _______ Artifacts: _______

Comments:

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0602

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-04

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2J710

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 17 Date Analyzed: 11/24/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.4	U
79-01-6	trichloroethene	2.4	U
71-43-2	benzene	2.4	U
108-88-3	toluene	2.4	U
108-90-7	chlorobenzene	2.4	U
100-41-4	ethylbenzene	2.4	U
1330-20-7	xylenes (total)	4.8	U
1634-04-4	methyl tert-butyl ether	2.4	U

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0602

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code:NA Case No.:NA SAS No.:NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-04

Sample wt/vol: 30.8 (g/mL) g Lab File ID: 4U512

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: 17 decanted: (Y/N) N Date Extracted:11/21/96

Concentrated Extract Volume: 1(mL) Date Analyzed: 11/22/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	391	U
209-96-8	acenaphthylene	391	U
83-32-9	acenaphthene	391	U
86-73-7	fluorene	391	U
85-01-8	phenanthrene	391	U
120-12-7	anthracene	391	U
206-44-0	fluoranthene	391	U
129-00-0	pyrene	391	U
56-55-3	benzo(a)anthracene	391	U
218-01-9	chrysene	391	U
205-99-2	benzo(b)fluoranthene	391	U
207-08-9	benzo(k)fluoranthene	391	U
50-32-8	benzo(a)pyrene	391	U
193-39-5	indeno(1,2,3-cd)pyrene	391	U
53-70-3	dibenz(a,h)anthracene	391	U
191-24-2	benzo(g,h,i)perylene	391	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0602

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-04

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J310

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 17 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction_____	60.2	U

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAISVMW0602

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-04

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J310

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. 17 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
	----------------TPH - Volatile Fraction	60.2	U

FORM I VOA OLM03.0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAISVMW0602

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-04

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: _83.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	6.6			P

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDSMW05

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-26

Sample wt/vol: 20.0 (g/mL) g Lab File ID: 2J714

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. 23 Date Analyzed: 11/24/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
75-35-4	1,1-dichloroethene	2.6	U
79-01-6	trichloroethene	2.6	U
71-43-2	benzene	1.8	J
108-88-3	toluene	0.44	J
108-90-7	chlorobenzene	2.6	U
100-41-4	ethylbenzene	3.2	
1330-20-7	xylenes (total)	6.8	
1634-04-4	methyl tert-butyl ether	2.6	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDSMW05

Lab Name: GENERAL ENGINEERING LABOR Contract:

Lab Code:NA Case No.:NA SAS No.:NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-26

Sample wt/vol: 30.2 (g/mL) g Lab File ID: 4U519

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: 23 decanted: (Y/N) N Date Extracted:11/21/96

Concentrated Extract Volume: 1(mL) Date Analyzed: 11/22/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
91-20-3	naphthalene	431	U
209-96-8	acenaphthylene	431	U
83-32-9	acenaphthene	431	U
86-73-7	fluorene	431	U
85-01-8	phenanthrene	431	U
120-12-7	anthracene	431	U
206-44-0	fluoranthene	431	U
129-00-0	pyrene	431	U
56-55-3	benzo(a)anthracene	431	U
218-01-9	chrysene	431	U
205-99-2	benzo(b)fluoranthene	431	U
207-08-9	benzo(k)fluoranthene	431	U
50-32-8	benzo(a)pyrene	431	U
193-39-5	indeno(1,2,3-cd)pyrene	431	U
53-70-3	dibenz(a,h)anthracene	431	U
191-24-2	benzo(g,h,i)perylene	431	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDSMW05

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-26

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J314

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. 23 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
	----------------TPH - Volatile Fraction_____	515	_____

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDSMW05

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317S

Matrix: (soil/water) SOIL Lab Sample ID: 9611317-26

Sample wt/vol: 10.0 (g/mL) g Lab File ID: A1J314

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. 23 Date Analyzed: 11/20/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
----------------	TPH - Volatile Fraction	515	

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIDSMW05

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317S

Matrix (soil/water): SOIL_ Lab Sample ID: 9611317-26

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: _77.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0			P

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:

FORM I - IN ILM03.0

GENERAL ENGINEERING LABORATORIES, INC.

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Brown & Root Environmental
Jackson Plaza, Suite A-600
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830

Contact: Mr. Bryn Howze

cc: HALI00197 Report Date: February 05, 1997

Sample ID	: Fuel Dispensing Station
Lab ID	: 9701449-01
Matrix	: Soil
Date Collected	: 01/23/97
Date Received	: 01/24/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Organic Carbon		2240	27.9	100	mg/kg	1.0	LS	01/28/97	1241	96983	1

M = Method	Method-Description
M 1	EPA 9060 modified

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Valerie Davis at (803) 769-7391.

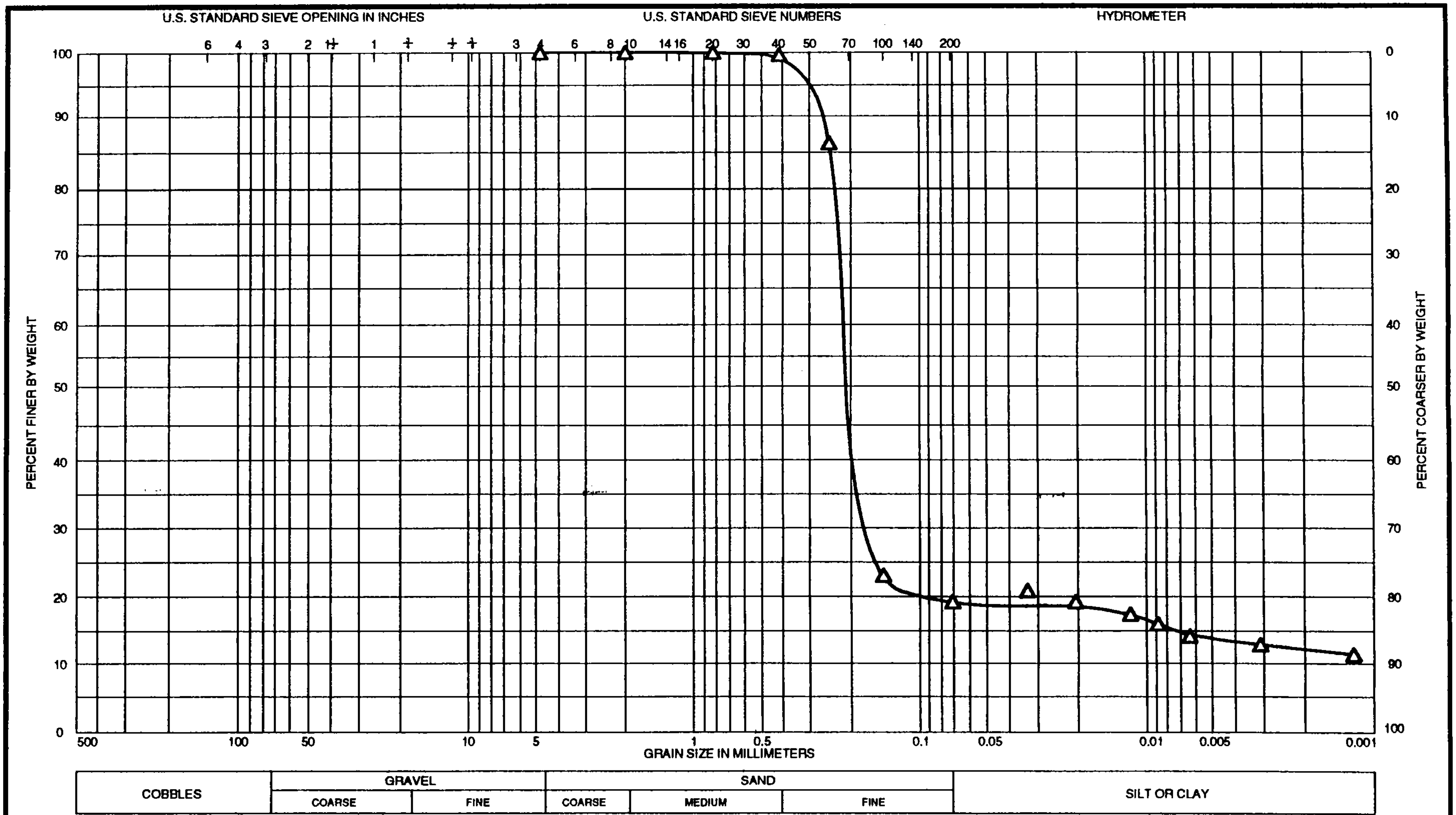
Valerie S Davis

Reviewed By

PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407

(803) 556-8171 • Fax (803) 766-1178

9701449-01



Sample No.	Elev. Or Depth	Classification	Nat w %	LL	PL	PI
PAI-SB-HA1-02		SC				
		% SAND = 81.0				
		% SILT = 5.2				
		% CLAY = 13.8				

GRADATION CURVES

GENERAL ENGINEERING LABORTORIES, INC.
Environmental Consulting and Analytical Services

Project Code hali00197

Project Name BROWN AND ROOT ENVIRONMENTAL

Boring No.

Date January 31, 1997

General Engineering Laboratories, Inc.
2040 Savage Road
Charleston, South Carolina 29414
P.O. Box 30712
Charleston, South Carolina 29417
(803) 556-8171

CHAIN OF CUSTODY RECORD

Client Name/Facility Name: Brown + Root Environ / Parris Is

Collected by/Company: J. Hofer / B+RE

SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods

Use F or P in the boxes to indicate whether sample was filtered and/or preserved

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# OF CONTAINERS	pH, conductivity	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify Lead	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type	TPH-GRO	PAH	Remarks
PAISUMW0101	11/12/96	1100		X			2						X	X									X	X	BTEX, MTBE
PAISUMW0201	↓	1315		X			2						X	X									X	X	
PAISUMW0301	↓	1420		X			2						X	✓									X	X	
PAISUMW0602	↓	1535		X			2						X	X									X	X	
PAITB0111396 (3 JWH)	↓	1100				X	3						X												Trip Blank
PAIRB0111396 (3 JWH)	↓	1600				X	5						X	X									X	X	Rinse Blank
PAISUMW0501	11/13/96	0820		X			2						X	X									X	X	
PAIMSMW0501	↓	0820		X			2						X	X									X	X	matrix spike msd
PAIFB0111396	↓	1040				X	5						X	X									X	X	Field Blank Potable water
PAISUMW0401	↓	1045		X			~~2~~ 3						X	X									X	X	run naphthalene also
PAIDPMW0401	↓	1045		X			~~2~~ 3						X	X									X	X	Field Dup run naphthalene also
PAIFB0211396	↓	1050				X	5						X	X									X	X	Field Blank DI water
PAIRB0111396	↓	1100				X	5						X	X									X	X	Rince blank

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
John Hofer	11/13/96	1200	Fed Ex Airbill # 8185715366				

Relinquished by:	Date:	Time:	Received by lab by:	Date:	Time:	Remarks:

White = sample collector Yellow = file Pink = with report

9701449

NUS CORPORATION — CHAIN OF CUSTODY RECORD

PROJECT NO.: 7387	SITE NAME: MCRD Parris Island, SC
SAMPLERS (SIGNATURE): Regina C. Dixon - Regina C Dixon	

STATION NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC-EPA method 415.1 - 802-9455	Grain Size Anal. 802-9455				REMARKS
Fuel Dispensing Station	1/23/97	1352		X	PAI ~~FDS~~ - SB - HA1 - 02	2	1	1				Grain size → with hydrometer for sand/silt + silt/clay - segregated @ 0.074mm + 0.0004mm

-01

RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
Regina C Dixon	1/23/96 1907				
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE/TIME:	REMARKS:	
		R Desrosiers	1-23-97 1707		

NUS 440 - 0484

APPENDIX F

GROUNDWATER ANALYTICAL RESULTS

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0101

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-15

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J510

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.52	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0101

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-15

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J510

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.52	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0101

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-15

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V113

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0101

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-15

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J417

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction_____	50.0	U

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW0101

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: _______ Case No.: _______ SAS No.: _______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-15

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	1.6	U		F

Color Before: _______ Clarity Before: _______ Texture: _______

Color After: _______ Clarity After: _______ Artifacts: _______

Comments:
GFAA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0201

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317W

Matrix: (soil/water) WATER   Lab Sample ID: 9611317-16

Sample wt/vol: 20 (g/ml) ml   Lab File ID: 1J511

Level: (low/med) LOW   Date Received: 11/18/96

% Moisture: not dec. ________   Date Analyzed: 11/22/96

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.38	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

FORM I VOA   OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0201

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-16

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J511

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.38	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

FORM I VOA OLM03.0

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0201

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O   Lab Sample ID: 9611317-16

Sample wt/vol: 500 (g/mL) mL   Lab File ID: 4V114

Level: (low/med) LOW   Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___   Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL)   Date Analyzed: 11/25/96

Injection Volume: 1.0(uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N) N   pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0201

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-16

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J418

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction	50.0	U

FORM I VOA OLM03.0

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW0201

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-16

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	4.8	B		F_

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-17

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J421

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	1840	
108-88-3	toluene	13.3	JB
100-41-4	ethylbenzene	191	
1330-20-7	xylenes (total)	73.2	J
1634--04-4	methyl tert-butyl ether	100	U

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-17

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J421

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	1840	
108-88-3	toluene	13.3	JB
100-41-4	ethylbenzene	191	
1330-20-7	xylenes (total)	73.2	J
1634--04-4	methyl tert-butyl ether	100	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-17

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V115

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0301

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-17

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J53

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction	11700	

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW0301

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-17

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	2.0	B		F

Color Before: ________ Clarity Before: ______ Texture: ______

Color After: ________ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-21

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J424

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	179	
108-88-3	toluene	659	B
100-41-4	ethylbenzene	850	
1330-20-7	xylenes (total)	1140	
1634-04-4	methyl tert-butyl ether	100	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-21

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J424

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	179	
108-88-3	toluene	659	B
100-41-4	ethylbenzene	850	
1330-20-7	xylenes (total)	1140	
1634-04-4	methyl tert-butyl ether	100	U

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-21

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V121

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0401

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-21

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J55

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 10.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction	10200	

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW0401

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-21

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	11.1			F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0501

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-20

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J423

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	1750	
108-88-3	toluene	1570	B
100-41-4	ethylbenzene	1980	
1330-20-7	xylenes (total)	3640	
1634-04-4	methyl tert-butyl ether	100	U

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0501

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-20

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J423

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	1750	
108-88-3	toluene	1570	B
100-41-4	ethylbenzene	1980	
1330-20-7	xylenes (total)	3640	
1634-04-4	methyl tert-butyl ether	100	U

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0501

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-20

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V120

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0501

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-20

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J54

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction	44800	

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW0501

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-20

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	258			F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0601

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-19

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J512

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	2.0	U
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0601

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-19

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J512

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	2.0	U
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0601

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-19

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V119

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted: 11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW0601

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-19

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J49

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
	----------------TPH - Volatile Fraction_____	50.0	U

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW0601

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-19

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	11.9			F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW1C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-22

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J425

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	470	
108-88-3	toluene	909	B
100-41-4	ethylbenzene	760	
91-20-3	Naphthalene	100	U
1330-20-7	xylenes (total)	1360	
1634-04-4	methyl tert-butyl ether	100	U

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW1C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-22

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J425

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	470	
108-88-3	toluene	909	B
100-41-4	ethylbenzene	760	
91-20-3	Naphthalene	100	U
1330-20-7	xylenes (total)	1360	
1634-04-4	methyl tert-butyl ether	100	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW1C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-22

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V122

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW1C01

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317W

Matrix: (soil/water) WATER   Lab Sample ID: 9611317-22

Sample wt/vol: 10 (g/ml) ml   Lab File ID: A1J422

Level: (low/med) LOW   Date Received: 11/18/96

% Moisture: not dec. ________   Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm)   Dilution Factor: 50.0

Soil Extract Volume:________(ml)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
	----------------TPH - Volatile Fraction	16600	

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW1C01

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-22

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	39.3			F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW1C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-23

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J426

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	496	
108-88-3	toluene	986	B
100-41-4	ethylbenzene	840	
91-20-3	Naphthalene	100	U
1330-20-7	xylenes (total)	1500	
1634-04-4	methyl tert-butyl ether	100	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW1C01

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317W

Matrix: (soil/water) WATER   Lab Sample ID: 9611317-23

Sample wt/vol: 20 (g/ml) ml   Lab File ID: 1J426

Level: (low/med) LOW   Date Received: 11/18/96

% Moisture: not dec. ________   Date Analyzed: 11/22/96

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 50.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	496	
108-88-3	toluene	986	B
100-41-4	ethylbenzene	840	
91-20-3	Naphthalene	100	U
1330-20-7	xylenes (total)	1500	
1634-04-4	methyl tert-butyl ether	100	U

FORM I VOA   OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW1C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-23

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V303

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/27/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIDPMW1C01

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317W

Matrix: (soil/water) WATER   Lab Sample ID: 9611317-23

Sample wt/vol: 10 (g/ml) ml   Lab File ID: A1J423

Level: (low/med) LOW   Date Received: 11/18/96

% Moisture: not dec. ________   Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm)   Dilution Factor: 50.0

Soil Extract Volume:________(ml)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction	14200	

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIDPMW1C01

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-23

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	71.8			F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW2C01

ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-24

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J513

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	2.0	U
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW2C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-24

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J513

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	2.0	U
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW2C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-24

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V304

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/27/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIGWMW2C01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-24

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J424

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction_____	4.80	J

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIGWMW2C01

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-24

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	1.6	U		F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIIDDF01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-25

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J514

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.36	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIIDDF01

ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-25

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J514

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.36	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIIDDF01

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-25

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V305

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/27/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIIDDF01

ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-25

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J57

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction_____	50.0	U

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIIDDF01

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-25

Level (low/med): LOW__ Date Received: 11/18/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	44.9			F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

QUALITY CONTROL SAMPLES

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAITB01111296

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-05

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J504

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.20	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAITB01111296

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-05

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J504

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.20	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAI-TB01111796

Lab Name: GENERAL ENGINEERING LABOR   Contract: NA

Lab Code: NA   Case No.: NA   SAS No.: NA   SDG No.: 6B317W

Matrix: (soil/water) WATER   Lab Sample ID: 9611317-14

Sample wt/vol: 20 (g/ml) ml   Lab File ID: 1J509

Level: (low/med) LOW   Date Received: 11/18/96

% Moisture: not dec. ________   Date Analyzed: 11/22/96

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	2.9	
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAI-TB01111796

ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-14

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J509

Level: (low/med) LOW Date Received: 11/18/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	2.9	
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB01111296

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-06

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J505

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	1.0	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	0.10	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB01111296

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-06

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J505

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	1.0	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	0.10	J

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB01111296

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-06

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V109

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB0111196

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-06

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J412

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction	50.0	U

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIRB0111129

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-06

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead_____	1.6	U		F_

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB01111396

ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-13

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J508

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.41	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	0.20	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB01111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-13

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J508

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.41	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	0.20	J

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB01111396

`ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-13

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V112

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIRB01111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-13

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J416

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
	----------------TPH - Volatile Fraction_____	50.0	U

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIRB0111139

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-13

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	1.6	U		F

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB01111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-09

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J506

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.74	J
100-41-4	ethylbenzene	1.0	J
1330-20-7	xylenes (total)	5.1	
1634-04-4	methyl tert-butyl ether	2.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB01111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-09

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J506

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.74	J
100-41-4	ethylbenzene	1.0	J
1330-20-7	xylenes (total)	5.1	
1634-04-4	methyl tert-butyl ether	2.0	U

FORM I VOA OLM03.0

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB01111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-09

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V110

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB01111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-09

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J413

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
----------------	TPH - Volatile Fraction_____	24.9	J

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIFB0111139

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: ______ Case No.: ______ SAS No.: ______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-09

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	1.8	B		F_

Color Before: ______ Clarity Before: ______ Texture: ______

Color After: ______ Clarity After: ______ Artifacts: ______

Comments:
GFAA

FORM I - IN ILM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB02111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-12

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J507

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.52	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	0.20	J

FORM I VOA OLM03.0

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB02111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-12

Sample wt/vol: 20 (g/ml) ml Lab File ID: 1J507

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/22/96

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/l	Q
71-43-2	benzene	2.0	U
108-88-3	toluene	0.52	J
100-41-4	ethylbenzene	2.0	U
1330-20-7	xylenes (total)	4.0	U
1634-04-4	methyl tert-butyl ether	0.20	J

FORM I VOA OLM03.0

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB02111396

ab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) GROUNDH2O Lab Sample ID: 9611317-12

Sample wt/vol: 500 (g/mL) mL Lab File ID: 4V111

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: ______ decanted: (Y/N)___ Date Extracted:11/19/96

Concentrated Extract Volume: 0.5(mL) Date Analyzed: 11/25/96

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
91-20-3	naphthalene	10.0	U
209-96-8	acenaphthylene	10.0	U
83-32-9	acenaphthene	10.0	U
86-73-7	fluorene	10.0	U
85-01-8	phenanthrene	10.0	U
120-12-7	anthracene	10.0	U
206-44-0	fluoranthene	10.0	U
129-00-0	pyrene	10.0	U
56-55-3	benzo(a)anthracene	10.0	U
218-01-9	chrysene	10.0	U
205-99-2	benzo(b)fluoranthene	10.0	U
207-08-9	benzo(k)fluoranthene	10.0	U
50-32-8	benzo(a)pyrene	10.0	U
193-39-5	indeno(1,2,3-cd)pyrene	10.0	U
53-70-3	dibenz(a,h)anthracene	10.0	U
191-24-2	benzo(g,h,i)perylene	10.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PAIFB02111396

Lab Name: GENERAL ENGINEERING LABOR Contract: NA

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: 6B317W

Matrix: (soil/water) WATER Lab Sample ID: 9611317-12

Sample wt/vol: 10 (g/ml) ml Lab File ID: A1J414

Level: (low/med) LOW Date Received: 11/14/96

% Moisture: not dec. ________ Date Analyzed: 11/21/96

GC Column: J&W DB-624(FID) ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(ml) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
	----------------TPH - Volatile Fraction_____	50.0	U

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

PAIFB0211139

Lab Name: GENERAL_ENGINEERING_LABS_ Contract: HALI00496_

Lab Code: _______ Case No.: _______ SAS No.: _______ SDG No.: 6B317W

Matrix (soil/water): WATER Lab Sample ID: 9611317-12

Level (low/med): LOW__ Date Received: 11/14/96

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	1.6	U		F

Color Before: ________ Clarity Before: ________ Texture: ________

Color After: ________ Clarity After: ________ Artifacts: ________

Comments:
GFAA

FORM I - IN ILM03.0

General Engineering Laboratories, Inc.
2040 Savage Road
Charleston, South Carolina 29414
P.O. Box 30712
Charleston, South Carolina 29417
(803) 556-8171

CHAIN OF CUSTODY RECORD

Client Name/Facility Name: Brown + Root Environ. / Parris Is

Collected by/Company: J. Hofer, B. Howze / B+RE

SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods

Use F or P in the boxes to indicate whether sample was filtered and/or preserved

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# OF CONTAINERS	pH, conductivity	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method required BTEX	METALS - specify Lead	Pesticide	Herbicide	Total Phenol	~~Acid Extractables~~ PAH	B/N Extractables	PCB's	Cyanide	Coliform - specify type	TPH-GRO	Naphthalene	Remarks
PAI-TB01111796	11/17/96	1000				X	3						X	~~X~~ SWH											Trip Blank
PAIGWMW0101		1013	X				5						X	X				X					X	~~X~~ SWH	
PAIGWMW0201		1037	X				5						X	X				X					X		
PAIGWMW0301		1100	X				5						X	X				X					X		
PAIMSMW0301		1100	X				5						X	X				X					X		Matrix spike/MSD
PAIGWMW0601		1125	X				5						X	X				X					X		
PAIGWMW0501		1140	X				5						X	X				X					X		
PAIGWMW0401		1200	X				5						X	X				X					X		
PAIGWMW1C01		1220	X				5						X	X				X					X	X	
PAIDPMW1C01		1220	X				5						X	X				X					X	X	Field Dup.
PAIGWMW2C01		1245	X				5						X	X				X					X		
~~PAITB02111796~~		~~1308~~				~~X~~	~~3~~					~~X~~ SWH	~~X~~												~~Trip Blank~~
PAIIDDF01		1415				X	5						X	X				X					X		

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
John Hofer	11/18/96	1245					

Relinquished by:	Date:	Time:	Received by lab by:	Date:	Time:	Remarks:
			R. Dessauve	11/18/96	1145	

White = sample collector Yellow = file Pink = with report

General Engineering La[illegible]ories, Inc.
2040 Savage Road
Charleston, South Carolina 29414
P.O. Box 30712
Charleston, South Carolina 29417
(803) 556-8171

CHAIN OF CUSTODY RECORD

Client Name/Facility Name: Brown + Root / Parris Is

Collected by/Company: J. Hofer, B. Howze / B+RE

SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods

Use F or P in the boxes to indicate whether sample was filtered and/or preserved

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# OF CONTAINERS	pH, conductivity	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	~~B/N Extractables~~ PAH	PCB's	Cyanide	Coliform - specify type	TPH-GRO		Remarks
PAIDSMW05	11/18/96	0825		X			2						X	X					X				X		

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
[signature]	11/18/96	1145					

Relinquished by:	Date:	Time:	Received by lab by:	Date:	Time:	Remarks:
			[signature]	11/18	1145	

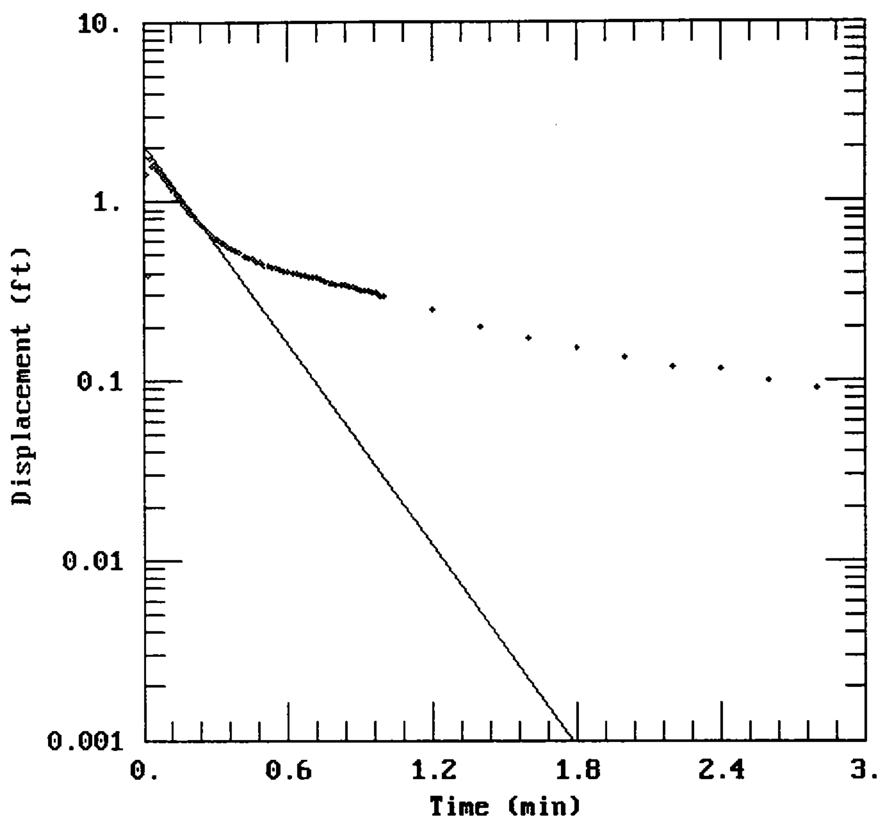
White = sample collector Yellow = file Pink = with report

APPENDIX G

SLUG TEST CALCULATIONS

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-1, SLUG-OUT TEST



DATA SET:
MW-1.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 1.79 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 19.89 ft
H = 7.89 ft

PARAMETER ESTIMATES:
K = 0.004658 cm/sec
y0 = 2.029 ft

AQTESOLV

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

                      A Q T E S O L V   R E S U L T S
                               Version 2.10

             Developed by Glenn M. Duffield, HydroSOLVE, Inc.
                 (c) 1988-1995  Geraghty & Miller, Inc.

01/17/97                                                                08:48:01

================================================================================
                                TEST DESCRIPTION

Data set........... MW-1.DAT
Output file........ MW-1.OUT
Data set title..... MW-1, SLUG-OUT TEST
Company............ Brown & Root Environmental
Project............ 7387
Client............. Navy CLEAN
Location........... MCRD Parris Island, SC
Test date.......... 11/15/96

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.79
   Radius of well casing............ 0.086
   Radius of wellbore............... 0.2
   Aquifer saturated thickness...... 19.89
   Well screen length............... 10
   Static height of water in well... 7.89
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.1311
   Effective wellbore radius........ 0.2
   Log(Re/Rw)....................... 2.492
   Constants A, B and C............. 3.074 ,   0.494,   0.000
   No. of observations.............. 139

================================================================================
                               ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

================================================================================
                    RESULTS FROM STATISTICAL CURVE MATCHING


STATISTICAL MATCH PARAMETER ESTIMATES

          Estimate          Std. Error
   K  =   2.3876E-003 +/-   1.2118E-004 cm/sec
   y0 =   1.4417E+000 +/-   3.9454E-002 ft


ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
```

weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 139
Number of estimated parameters.... 2
Degrees of freedom................ 137
Residual mean..................... 0.02529
Residual standard deviation....... 0.1298
Residual variance................. 0.01685

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0083	1.42	1.4157	0.0043052	1
0.0166	0.383	1.3901	-1.0071	1
0.025	1.741	1.3647	0.37628	1
0.0333	1.559	1.3401	0.21893	1
0.0416	1.617	1.3159	0.30113	1
0.05	1.554	1.2918	0.26218	1
0.0583	1.506	1.2685	0.23752	1
0.0666	1.458	1.2456	0.21243	1
0.075	1.41	1.2228	0.18719	1
0.0833	1.358	1.2007	0.15728	1
0.0916	1.314	1.179	0.13496	1
0.1	1.271	1.1575	0.11351	1
0.1083	1.228	1.1366	0.091419	1
0.1166	1.185	1.1161	0.068947	1
0.125	1.142	1.0957	0.046345	1
0.1333	1.103	1.0759	0.027134	1
0.1416	1.07	1.0564	0.013565	1
0.15	1.031	1.0371	-0.0061261	1
0.1583	0.998	1.0184	-0.020394	1
0.1666	0.959	1	-0.041001	1
0.175	0.93	0.98172	-0.051724	1
0.1833	0.902	0.96399	-0.061993	1
0.1916	0.873	0.94658	-0.073582	1
0.2	0.844	0.92928	-0.085281	1
0.2083	0.82	0.9125	-0.092497	1
0.2166	0.796	0.89602	-0.10002	1
0.225	0.772	0.87964	-0.10764	1
0.2333	0.753	0.86375	-0.11075	1
0.2416	0.734	0.84815	-0.11415	1
0.25	0.714	0.83265	-0.11865	1
0.2583	0.7	0.81761	-0.11761	1
0.2666	0.681	0.80284	-0.12184	1
0.275	0.667	0.78817	-0.12117	1
0.2833	0.647	0.77394	-0.12694	1
0.2916	0.638	0.75996	-0.12196	1
0.3	0.623	0.74607	-0.12307	1
0.3083	0.609	0.73259	-0.12359	1
0.3166	0.599	0.71936	-0.12036	1
0.325	0.59	0.70621	-0.11621	1
0.3333	0.58	0.69346	-0.11346	1
0.35	0.561	0.66849	-0.10749	1
0.3666	0.542	0.64456	-0.10256	1
0.3833	0.527	0.62135	-0.094349	1
0.4	0.513	0.59898	-0.085975	1
0.4166	0.499	0.57753	-0.078534	1

0.4333	0.479	0.55674	-0.077738	1
0.45	0.479	0.53669	-0.057691	1
0.4666	0.46	0.51748	-0.057479	1
0.4833	0.455	0.49885	-0.043846	1
0.5	0.441	0.48088	-0.039883	1
0.5166	0.436	0.46367	-0.027669	1
0.5333	0.431	0.44697	-0.015973	1
0.55	0.422	0.43088	-0.0088788	1
0.5666	0.412	0.41545	-0.0034548	1
0.5833	0.407	0.4005	0.0065049	1
0.6	0.407	0.38607	0.020926	1
0.6166	0.398	0.37225	0.025746	1
0.6333	0.393	0.35885	0.03415	1
0.65	0.388	0.34593	0.042072	1
0.6666	0.388	0.33355	0.054455	1
0.6833	0.379	0.32153	0.057465	1
0.7	0.374	0.30996	0.064043	1
0.7166	0.374	0.29886	0.075138	1
0.7333	0.364	0.2881	0.0759	1
0.75	0.359	0.27773	0.081274	1
0.7666	0.35	0.26778	0.082215	1
0.7833	0.35	0.25814	0.091858	1
0.8	0.345	0.24885	0.096153	1
0.8166	0.345	0.23994	0.10506	1
0.8333	0.34	0.2313	0.1087	1
0.85	0.331	0.22297	0.10803	1
0.8666	0.331	0.21499	0.11601	1
0.8833	0.326	0.20725	0.11875	1
0.9	0.321	0.19979	0.12121	1
0.9166	0.316	0.19263	0.12337	1
0.9333	0.316	0.1857	0.1303	1
0.95	0.307	0.17901	0.12799	1
0.9666	0.307	0.1726	0.1344	1
0.9833	0.297	0.16639	0.13061	1
1	0.297	0.1604	0.1366	1
1.2	0.249	0.10338	0.14562	1
1.4	0.201	0.066637	0.13436	1
1.6	0.172	0.042952	0.12905	1
1.8	0.153	0.027685	0.12532	1
2	0.134	0.017844	0.11616	1
2.2	0.119	0.011502	0.1075	1
2.4	0.115	0.0074136	0.10759	1
2.6	0.1	0.0047785	0.095222	1
2.8	0.091	0.00308	0.08792	1
3	0.081	0.0019852	0.079015	1
3.2	0.076	0.0012796	0.07472	1
3.4	0.071	0.00082477	0.070175	1
3.6	0.067	0.00053161	0.066468	1
3.8	0.067	0.00034266	0.066657	1
4	0.057	0.00022086	0.056779	1
4.2	0.052	0.00014236	0.051858	1
4.4	0.057	9.1758E-005	0.056908	1
4.6	0.052	5.9143E-005	0.051941	1
4.8	0.047	3.8121E-005	0.046962	1
5	0.052	2.4571E-005	0.051975	1
5.2	0.047	1.5838E-005	0.046984	1
5.4	0.038	1.0208E-005	0.03799	1
5.6	0.043	6.5798E-006	0.042993	1
5.8	0.043	4.2411E-006	0.042996	1
6	0.043	2.7336E-006	0.042997	1

6.2	0.038	1.762E-006	0.037998	1
6.4	0.038	1.1357E-006	0.037999	1
6.6	0.038	7.3202E-007	0.037999	1
6.8	0.033	4.7183E-007	0.033	1
7	0.038	3.0412E-007	0.038	1
7.2	0.038	1.9602E-007	0.038	1
7.4	0.043	1.2635E-007	0.043	1
7.6	0.043	8.1439E-008	0.043	1
7.8	0.038	5.2492E-008	0.038	1
8	0.028	3.3834E-008	0.028	1
8.2	0.028	2.1808E-008	0.028	1
8.4	0.028	1.4057E-008	0.028	1
8.6	0.033	9.0603E-009	0.033	1
8.8	0.028	5.8399E-009	0.028	1
9	0.019	3.7641E-009	0.019	1
9.2	0.028	2.4262E-009	0.028	1
9.4	0.028	1.5638E-009	0.028	1
9.6	0.023	1.008E-009	0.023	1
9.8	0.038	6.497E-010	0.038	1
10	0.019	4.1877E-010	0.019	1
11	0.023	4.6589E-011	0.023	1
12	0.023	5.1831E-012	0.023	1
13	0.019	5.7663E-013	0.019	1
14	0.014	6.4152E-014	0.014	1
15	0.014	7.137E-015	0.014	1
16	0.009	7.9401E-016	0.009	1
17	0.014	8.8335E-017	0.014	1
18	0.019	9.8275E-018	0.019	1
19	0.019	1.0933E-018	0.019	1
20	0.009	1.2164E-019	0.009	1
21	0.009	1.3532E-020	0.009	1
22	0.009	1.5055E-021	0.009	1
23	0.014	1.6749E-022	0.014	1
24	0.014	1.8634E-023	0.014	1

==

RESULTS FROM VISUAL CURVE MATCHING

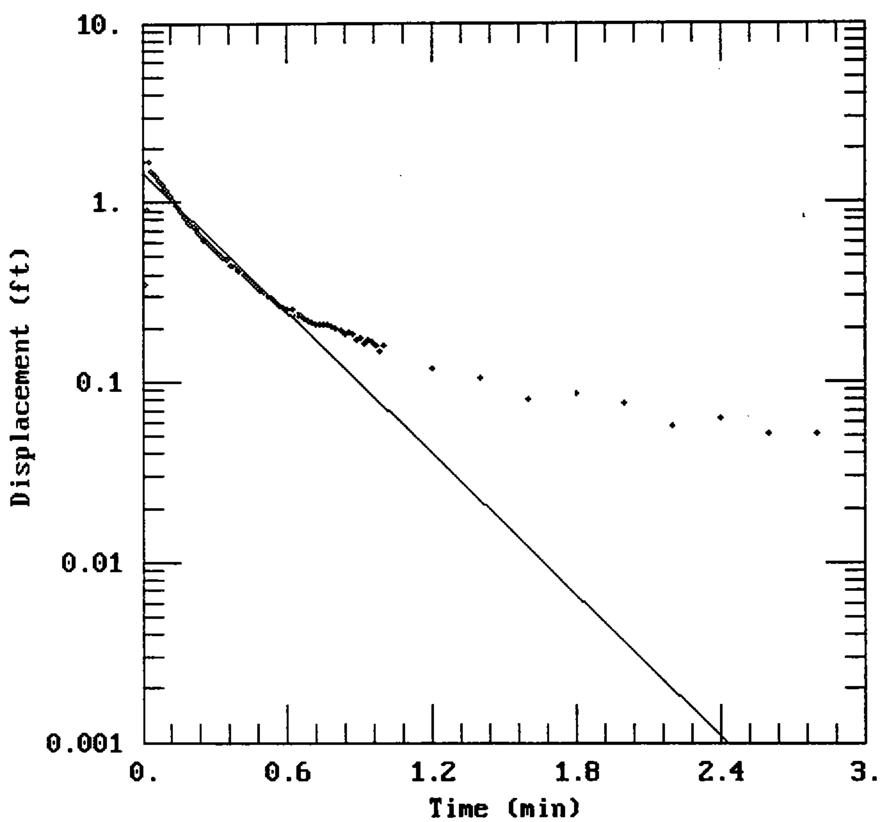
VISUAL MATCH PARAMETER ESTIMATES

```
          Estimate
   K  =   4.6583E-003 cm/sec
   y0 =   2.0289E+000 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-2, SLUG-OUT TEST



DATA SET:
MW-2.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 1.67 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 20.2 ft
H = 9. ft

PARAMETER ESTIMATES:
K = 0.003352 cm/sec
y0 = 1.442 ft

AQTESOLV

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
```

A Q T E S O L V   R E S U L T S
Version 2.10

Developed by Glenn M. Duffield, HydroSOLVE, Inc.

01/17/97 09:01:36

TEST DESCRIPTION

```
Data set........... MW-2.DAT
Output file........ MW-2.OUT
Data set title..... MW-2, SLUG-OUT TEST
Company............ Brown & Root Environmental
Project............ 7387
Client............. Navy CLEAN
Location........... MCRD Parris Island, SC
Test date.......... 11/17/96

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.67
   Radius of well casing............ 0.086
   Radius of wellbore............... 0.2
   Aquifer saturated thickness...... 20.2
   Well screen length............... 10
   Static height of water in well... 9
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.1311
   Effective wellbore radius........ 0.2
   Log(Re/Rw)....................... 2.562
   Constants A, B and C............. 3.074 ,   0.494,   0.000
   No. of observations.............. 128
```

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

```
           Estimate           Std. Error
   K  =   3.1177E-003 +/-   1.5783E-004 cm/sec
   y0 =   1.3878E+000 +/-   4.0529E-002 ft
```

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated

weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 128
Number of estimated parameters.... 2
Degrees of freedom................ 126
Residual mean..................... 0.01262
Residual standard deviation....... 0.1205
Residual variance................. 0.01451

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0083	0.35	1.3561	-1.0061	1
0.0166	0.911	1.325	-0.41404	1
0.025	1.669	1.2944	0.37464	1
0.0333	1.501	1.2647	0.23626	1
0.0416	1.468	1.2358	0.23219	1
0.05	1.42	1.2072	0.2128	1
0.0583	1.372	1.1796	0.19242	1
0.0666	1.329	1.1526	0.17641	1
0.075	1.286	1.1259	0.1601	1
0.0833	1.242	1.1001	0.14186	1
0.0916	1.199	1.075	0.12403	1
0.1	1.161	1.0501	0.11092	1
0.1083	1.118	1.0261	0.091943	1
0.1166	1.084	1.0026	0.081419	1
0.125	1.041	0.97937	0.061631	1
0.1333	1.007	0.95696	0.050039	1
0.1416	0.969	0.93507	0.033934	1
0.15	0.935	0.91342	0.021583	1
0.1583	0.897	0.89252	0.0044817	1
0.1666	0.868	0.8721	-0.0040977	1
0.175	0.834	0.85191	-0.017907	1
0.1833	0.806	0.83242	-0.026415	1
0.1916	0.777	0.81337	-0.03637	1
0.2	0.753	0.79454	-0.041538	1
0.2083	0.729	0.77636	-0.04736	1
0.2166	0.705	0.7586	-0.053597	1
0.225	0.681	0.74103	-0.060033	1
0.2333	0.662	0.72408	-0.062079	1
0.2416	0.647	0.70751	-0.060512	1
0.25	0.623	0.69113	-0.068131	1
0.2583	0.614	0.67532	-0.061319	1
0.2666	0.595	0.65987	-0.064867	1
0.275	0.58	0.64459	-0.06459	1
0.2833	0.571	0.62984	-0.058842	1
0.2916	0.556	0.61543	-0.059431	1
0.3	0.542	0.60118	-0.059183	1
0.3083	0.532	0.58743	-0.055428	1
0.3166	0.523	0.57399	-0.050988	1
0.325	0.508	0.5607	-0.052698	1
0.3333	0.499	0.54787	-0.04887	1
0.35	0.479	0.52294	-0.04394	1
0.3666	0.451	0.49928	-0.048285	1
0.3833	0.441	0.47657	-0.035566	1
0.4	0.417	0.45488	-0.037881	1
0.4166	0.393	0.4343	-0.041304	1

0.4333	0.374	0.41454	-0.040542	1
0.45	0.359	0.39568	-0.03668	1
0.4666	0.345	0.37778	-0.032781	1
0.4833	0.326	0.36059	-0.034591	1
0.5	0.316	0.34418	-0.028183	1
0.5166	0.302	0.32861	-0.026614	1
0.5333	0.292	0.31366	-0.021661	1
0.55	0.278	0.29939	-0.021389	1
0.5666	0.268	0.28585	-0.017845	1
0.5833	0.259	0.27284	-0.013839	1
0.6	0.254	0.26042	-0.006424	1
0.6166	0.254	0.24864	0.0053565	1
0.6333	0.235	0.23733	-0.0023296	1
0.65	0.235	0.22653	0.0084694	1
0.6666	0.225	0.21628	0.0087168	1
0.6833	0.22	0.20644	0.013558	1
0.7	0.215	0.19705	0.017952	1
0.7166	0.211	0.18813	0.022865	1
0.7333	0.211	0.17957	0.031426	1
0.75	0.211	0.1714	0.039597	1
0.7666	0.211	0.16365	0.047351	1
0.7833	0.206	0.1562	0.049797	1
0.8	0.201	0.1491	0.051905	1
0.8166	0.196	0.14235	0.053649	1
0.8333	0.187	0.13587	0.051126	1
0.85	0.191	0.12969	0.061309	1
0.8666	0.187	0.12382	0.063176	1
0.8833	0.172	0.11819	0.05381	1
0.9	0.177	0.11281	0.064188	1
0.9166	0.163	0.10771	0.055291	1
0.9333	0.172	0.10281	0.069192	1
0.95	0.167	0.09813	0.06887	1
0.9666	0.158	0.093691	0.064309	1
0.9833	0.148	0.089428	0.058572	1
1	0.158	0.085359	0.072641	1
1.2	0.119	0.048869	0.070131	1
1.4	0.105	0.027978	0.077022	1
1.6	0.081	0.016018	0.064982	1
1.8	0.086	0.0091702	0.07683	1
2	0.076	0.00525	0.07075	1
2.2	0.057	0.0030057	0.053994	1
2.4	0.062	0.0017208	0.060279	1
2.6	0.052	0.00098517	0.051015	1
2.8	0.052	0.00056402	0.051436	1
3	0.047	0.00032291	0.046677	1
3.2	0.033	0.00018487	0.032815	1
3.4	0.033	0.00010584	0.032894	1
3.6	0.033	6.0594E-005	0.032939	1
3.8	0.028	3.469E-005	0.027965	1
4	0.023	1.9861E-005	0.02298	1
4.2	0.028	1.137E-005	0.027989	1
4.4	0.023	6.5097E-006	0.022993	1
4.6	0.019	3.7269E-006	0.018996	1
4.8	0.028	2.1337E-006	0.027998	1
5	0.019	1.2215E-006	0.018999	1
5.2	0.019	6.9935E-007	0.018999	1
5.4	0.019	4.0038E-007	0.019	1
5.6	0.023	2.2922E-007	0.023	1
5.8	0.009	1.3123E-007	0.0089999	1
6	0.023	7.5132E-008	0.023	1

6.2	0.019	4.3014E-008	0.019	1
6.4	0.019	2.4626E-008	0.019	1
6.6	0.014	1.4099E-008	0.014	1
6.8	0.009	8.0715E-009	0.009	1
7	0.014	4.621E-009	0.014	1
7.2	0.009	2.6456E-009	0.009	1
7.4	0.009	1.5146E-009	0.009	1
7.6	0.019	8.6714E-010	0.019	1
7.8	0.014	4.9645E-010	0.014	1
8	0.019	2.8422E-010	0.019	1
8.2	0.009	1.6272E-010	0.009	1
8.4	0.004	9.3158E-011	0.004	1
8.6	0.004	5.3334E-011	0.004	1
8.8	0.014	3.0534E-011	0.014	1
9	0.014	1.7481E-011	0.014	1
9.2	0.009	1.0008E-011	0.009	1
9.4	0.004	5.7298E-012	0.004	1
9.6	0.009	3.2803E-012	0.009	1
9.8	0.004	1.878E-012	0.004	1
10	0.009	1.0752E-012	0.009	1
11	0.014	6.613E-014	0.014	1
12	0.009	4.0674E-015	0.009	1
17	0.009	3.5801E-021	0.009	1

==

RESULTS FROM VISUAL CURVE MATCHING

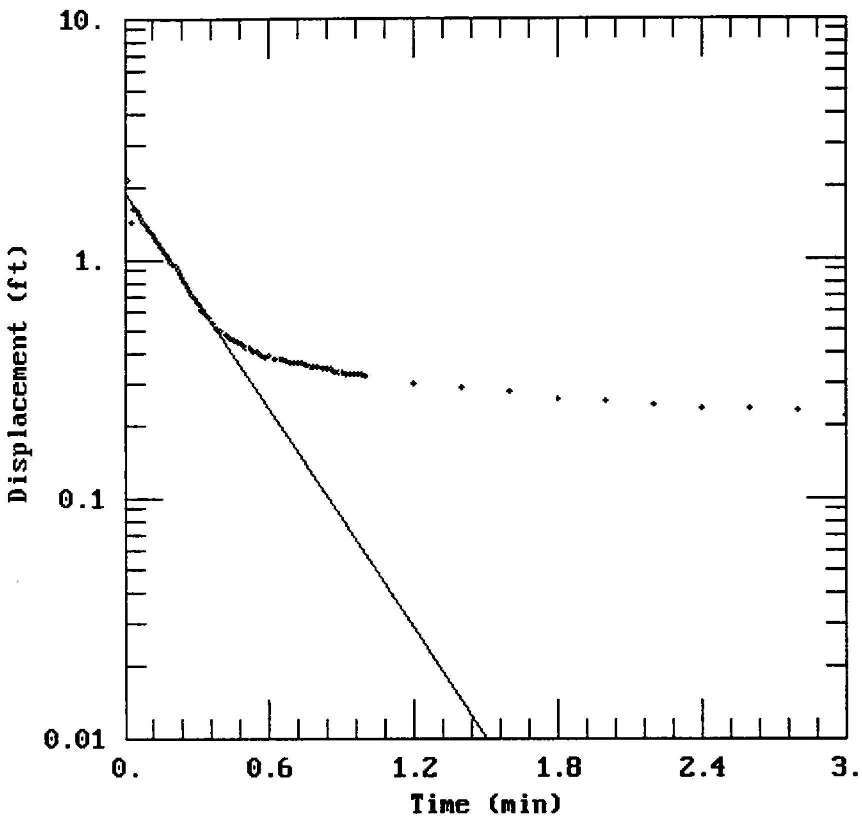
VISUAL MATCH PARAMETER ESTIMATES

```
          Estimate
   K  =   3.3522E-003 cm/sec
   y0 =   1.4417E+000 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-3, SLUG-OUT TEST



DATA SET:
MW-3.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 2.1 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 20.15 ft
H = 9.15 ft

PARAMETER ESTIMATES:
K = 0.003924 cm/sec
y0 = 1.886 ft

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A Q T E S O L V   R E S U L T S
Version 2.10

Developed by Glenn M. Duffield, HydroSOLVE, Inc.

01/17/97 14:40:00

TEST DESCRIPTION

Data set........... MW-3.DAT
Output file........ MW-3.OUT
Data set title..... MW-3, SLUG-OUT TEST
Company............ Brown & Root Environmental
Project............ 7387
Client............. Navy CLEAN
Location........... MCRD Parris Island, SC
Test date.......... 11/15/96

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 2.1
Radius of well casing............ 0.086
Radius of wellbore............... 0.2
Aquifer saturated thickness...... 20.15
Well screen length............... 10
Static height of water in well... 9.15
Gravel pack porosity............. 0.3
Effective well casing radius..... 0.1311
Effective wellbore radius........ 0.2
Log(Re/Rw)....................... 2.572
Constants A, B and C............. 3.074 , 0.494, 0.000
No. of observations.............. 146

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error	
K =	2.9072E-003	+/-	1.3456E-004	cm/sec
y0 =	1.6944E+000	+/-	4.5392E-002	ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated

weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals.............. 146
Number of estimated parameters.... 2
Degrees of freedom............... 144
Residual mean.................... 0.0703
Residual standard deviation....... 0.1332
Residual variance................ 0.01774

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0083	2.159	1.6583	0.50066	1
0.025	1.42	1.5881	-0.16812	1
0.0333	1.636	1.5543	0.081668	1
0.0416	1.641	1.5213	0.11973	1
0.05	1.588	1.4885	0.099484	1
0.0583	1.54	1.4568	0.083151	1
0.0666	1.482	1.4259	0.056144	1
0.075	1.444	1.3952	0.048839	1
0.0833	1.41	1.3655	0.04452	1
0.0916	1.372	1.3364	0.035569	1
0.1	1.334	1.3077	0.026339	1
0.1083	1.3	1.2798	0.020159	1
0.1166	1.271	1.2526	0.018386	1
0.125	1.228	1.2256	0.0023518	1
0.1333	1.199	1.1996	-0.00057361	1
0.1416	1.17	1.1741	-0.0040538	1
0.15	1.127	1.1488	-0.021779	1
0.1583	1.103	1.1243	-0.02134	1
0.1666	1.07	1.1004	-0.030421	1
0.175	1.041	1.0767	-0.035731	1
0.1833	1.007	1.0538	-0.046825	1
0.1916	0.978	1.0314	-0.053406	1
0.2	0.954	1.0092	-0.055202	1
0.2083	0.93	0.98773	-0.057732	1
0.2166	0.897	0.96672	-0.069719	1
0.225	0.868	0.94591	-0.077908	1
0.2333	0.844	0.92578	-0.081784	1
0.2416	0.815	0.90609	-0.091089	1
0.25	0.796	0.88658	-0.090583	1
0.2583	0.762	0.86772	-0.10572	1
0.2666	0.738	0.84926	-0.11126	1
0.275	0.714	0.83098	-0.11698	1
0.2833	0.695	0.8133	-0.1183	1
0.2916	0.681	0.796	-0.115	1
0.3	0.657	0.77886	-0.12186	1
0.3083	0.643	0.76229	-0.11929	1
0.3166	0.619	0.74608	-0.12708	1
0.325	0.609	0.73002	-0.12102	1
0.3333	0.59	0.71448	-0.12448	1
0.35	0.566	0.68423	-0.11823	1
0.3666	0.537	0.65543	-0.11843	1
0.3833	0.508	0.62767	-0.11967	1
0.4	0.499	0.6011	-0.1021	1
0.4166	0.479	0.57579	-0.096793	1
0.4333	0.465	0.55141	-0.086412	1

0.45	0.46	0.52806	-0.068063	1
0.4666	0.446	0.50583	-0.059834	1
0.4833	0.441	0.48441	-0.043415	1
0.5	0.427	0.4639	-0.036903	1
0.5166	0.422	0.44437	-0.022375	1
0.5333	0.412	0.42556	-0.013558	1
0.55	0.412	0.40754	0.0044616	1
0.5666	0.398	0.39038	0.0076172	1
0.5833	0.388	0.37385	0.014147	1
0.6	0.393	0.35802	0.034978	1
0.6166	0.383	0.34295	0.040049	1
0.6333	0.383	0.32843	0.054571	1
0.65	0.379	0.31452	0.064478	1
0.6666	0.374	0.30128	0.072718	1
0.6833	0.369	0.28852	0.080475	1
0.7	0.364	0.27631	0.087692	1
0.7166	0.364	0.26468	0.099324	1
0.7333	0.364	0.25347	0.11053	1
0.75	0.359	0.24274	0.11626	1
0.7666	0.355	0.23252	0.12248	1
0.7833	0.35	0.22267	0.12733	1
0.8	0.355	0.21324	0.14176	1
0.8166	0.345	0.20427	0.14073	1
0.8333	0.345	0.19562	0.14938	1
0.85	0.345	0.18733	0.15767	1
0.8666	0.335	0.17945	0.15555	1
0.8833	0.335	0.17185	0.16315	1
0.9	0.335	0.16457	0.17043	1
0.9166	0.331	0.15765	0.17335	1
0.9333	0.331	0.15097	0.18003	1
0.95	0.331	0.14458	0.18642	1
0.9666	0.326	0.13849	0.18751	1
0.9833	0.326	0.13263	0.19337	1
1	0.321	0.12701	0.19399	1
1.2	0.297	0.07565	0.22135	1
1.4	0.287	0.045058	0.24194	1
1.6	0.278	0.026837	0.25116	1
1.8	0.259	0.015985	0.24302	1
2	0.254	0.0095208	0.24448	1
2.2	0.244	0.0056707	0.23833	1
2.4	0.235	0.0033776	0.23162	1
2.6	0.235	0.0020117	0.23299	1
2.8	0.23	0.0011982	0.2288	1
3	0.22	0.00071368	0.21929	1
3.2	0.211	0.00042508	0.21057	1
3.4	0.22	0.00025318	0.21975	1
3.6	0.206	0.0001508	0.20585	1
3.8	0.201	8.9818E-005	0.20091	1
4	0.201	5.3497E-005	0.20095	1
4.2	0.187	3.1864E-005	0.18697	1
4.4	0.187	1.8979E-005	0.18698	1
4.6	0.182	1.1304E-005	0.18199	1
4.8	0.182	6.7328E-006	0.18199	1
5	0.177	4.0102E-006	0.177	1
5.2	0.167	2.3885E-006	0.167	1
5.4	0.167	1.4226E-006	0.167	1
5.6	0.167	8.4734E-007	0.167	1
5.8	0.167	5.0469E-007	0.167	1
6	0.158	3.006E-007	0.158	1
6.2	0.158	1.7904E-007	0.158	1

6.4	0.153	1.0664E-007	0.153	1
6.6	0.148	6.3517E-008	0.148	1
6.8	0.148	3.7832E-008	0.148	1
7	0.148	2.2533E-008	0.148	1
7.2	0.139	1.3421E-008	0.139	1
7.4	0.129	7.9938E-009	0.129	1
7.6	0.139	4.7612E-009	0.139	1
7.8	0.134	2.8359E-009	0.134	1
8	0.124	1.6891E-009	0.124	1
8.2	0.119	1.006E-009	0.119	1
8.4	0.134	5.9922E-010	0.134	1
8.6	0.124	3.569E-010	0.124	1
8.8	0.119	2.1258E-010	0.119	1
9	0.119	1.2661E-010	0.119	1
9.2	0.119	7.5413E-011	0.119	1
9.4	0.115	4.4917E-011	0.115	1
9.6	0.115	2.6753E-011	0.115	1
9.8	0.11	1.5935E-011	0.11	1
10	0.105	9.491E-012	0.105	1
11	0.1	7.1144E-013	0.1	1
12	0.095	5.333E-014	0.095	1
13	0.086	3.9976E-015	0.086	1
14	0.076	2.9966E-016	0.076	1
15	0.071	2.2463E-017	0.071	1
16	0.067	1.6838E-018	0.067	1
17	0.062	1.2622E-019	0.062	1
18	0.057	9.4613E-021	0.057	1
19	0.052	7.0922E-022	0.052	1
20	0.052	5.3163E-023	0.052	1
21	0.047	3.9851E-024	0.047	1
22	0.043	2.9872E-025	0.043	1
23	0.038	2.2392E-026	0.038	1
24	0.038	1.6785E-027	0.038	1
25	0.033	1.2582E-028	0.033	1
26	0.038	9.4317E-030	0.038	1
27	0.033	7.07E-031	0.033	1
28	0.028	5.2997E-032	0.028	1
29	0.028	3.9726E-033	0.028	1
30	0.033	2.9779E-034	0.033	1
31	0.033	2.2322E-035	0.033	1
32	0.028	1.6733E-036	0.028	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	3.9239E-003 cm/sec
y0 =	1.8864E+000 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

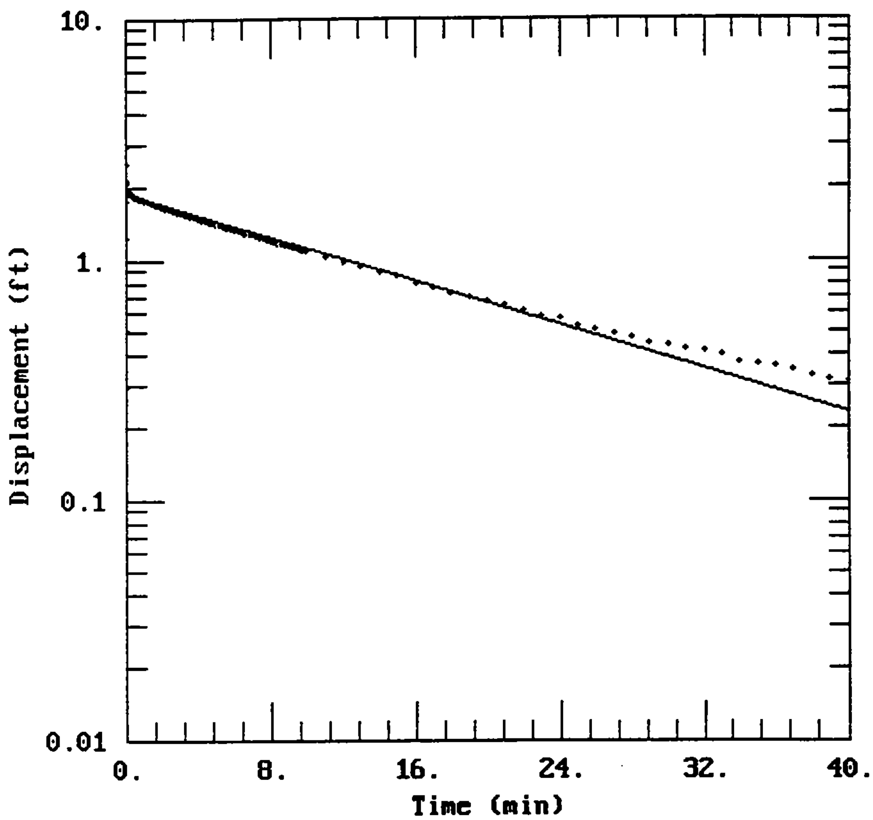
CLIENT: Navy CLEAN

COMPANY: Brown & Root Environmental

LOCATION: MCRD Parris Island, SC

PROJECT: 7387

MW-4, SLUG-OUT TEST



DATA SET:
MW-4.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 2.1 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 5. ft
b = 19.27 ft
H = 19.27 ft

PARAMETER ESTIMATES:
K = 0.0001466 cm/sec
y0 = 1.897 ft

AQTESOLV

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<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

                        A Q T E S O L V   R E S U L T S
                                  Version 2.10

                 Developed by Glenn M. Duffield, HydroSOLVE, Inc.
                      (c) 1988-1995  Geraghty & Miller, Inc.

01/17/97                                                                11:08:15

================================================================================
                                  TEST DESCRIPTION

Data set........... MW-4.DAT
Output file........ MW-4.OUT
Data set title..... MW-4, SLUG-OUT TEST
Company............ Brown & Root Environmental
Project............ 7387
Client............. Navy CLEAN
Location........... MCRD Parris Island, SC
Test date.......... 11/16/96

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 2.1
   Radius of well casing............ 0.086
   Radius of wellbore............... 0.2
   Aquifer saturated thickness...... 19.27
   Well screen length............... 5
   Static height of water in well... 19.27
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.1311
   Effective wellbore radius........ 0.2
   Log(Re/Rw)....................... 3.191
   Constants A, B and C............. 0.000 ,  0.000,  1.813
   No. of observations.............. 199

================================================================================
                                  ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

================================================================================
                      RESULTS FROM STATISTICAL CURVE MATCHING


STATISTICAL MATCH PARAMETER ESTIMATES

           Estimate          Std. Error
   K  =   1.3768E-004 +/-   6.0290E-006 cm/sec
   y0 =   1.8603E+000 +/-   2.0151E-002 ft


ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
```

weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 199
Number of estimated parameters.... 2
Degrees of freedom................ 197
Residual mean..................... 0.01153
Residual standard deviation....... 0.187
Residual variance................. 0.03498

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0083	0.513	1.8595	-1.3465	1
0.0166	1.761	1.8587	-0.09773	1
0.025	0.292	1.858	-1.566	1
0.0333	2.955	1.8572	1.0978	1
0.0416	2.485	1.8564	0.62857	1
0.05	1.242	1.8557	-0.61366	1
0.0583	2.087	1.8549	0.2321	1
0.0666	2.159	1.8541	0.30486	1
0.075	1.977	1.8534	0.12363	1
0.0833	1.981	1.8526	0.12839	1
0.0916	1.986	1.8519	0.13415	1
0.1	1.972	1.8511	0.12092	1
0.1083	1.948	1.8503	0.097677	1
0.1166	1.948	1.8496	0.098437	1
0.125	1.933	1.8488	0.084205	1
0.1333	1.933	1.848	0.084963	1
0.1416	1.933	1.8473	0.085721	1
0.15	1.929	1.8465	0.082488	1
0.1583	1.919	1.8458	0.073246	1
0.1666	1.914	1.845	0.069003	1
0.175	1.914	1.8442	0.069769	1
0.1833	1.914	1.8435	0.070526	1
0.1916	1.905	1.8427	0.062282	1
0.2	1.9	1.842	0.058047	1
0.2083	1.905	1.8412	0.063803	1
0.2166	1.895	1.8404	0.054558	1
0.225	1.89	1.8397	0.050322	1
0.2333	1.895	1.8389	0.056077	1
0.2416	1.89	1.8382	0.051831	1
0.25	1.885	1.8374	0.047594	1
0.2583	1.885	1.8367	0.048348	1
0.2666	1.881	1.8359	0.045102	1
0.275	1.881	1.8351	0.045864	1
0.2833	1.881	1.8344	0.046617	1
0.2916	1.885	1.8336	0.051369	1
0.3	1.881	1.8329	0.048131	1
0.3083	1.881	1.8321	0.048883	1
0.3166	1.871	1.8314	0.039634	1
0.325	1.876	1.8306	0.045395	1
0.3333	1.871	1.8299	0.041146	1
0.35	1.876	1.8283	0.047656	1
0.3666	1.861	1.8268	0.034156	1
0.3833	1.857	1.8253	0.031663	1
0.4	1.866	1.8238	0.04217	1
0.4166	1.857	1.8223	0.034666	1

0.4333	1.847	1.8208	0.02617	1
0.45	1.852	1.8193	0.032673	1
0.4666	1.847	1.8178	0.029165	1
0.4833	1.837	1.8163	0.020665	1
0.5	1.837	1.8148	0.022164	1
0.5166	1.833	1.8133	0.019653	1
0.5333	1.828	1.8119	0.01615	1
0.55	1.833	1.8104	0.022645	1
0.5666	1.828	1.8089	0.01913	1
0.5833	1.818	1.8074	0.010623	1
0.6	1.823	1.8059	0.017114	1
0.6166	1.818	1.8044	0.013596	1
0.6333	1.813	1.8029	0.010085	1
0.65	1.813	1.8014	0.011573	1
0.6666	1.818	1.7999	0.018051	1
0.6833	1.809	1.7985	0.010536	1
0.7	1.813	1.797	0.01602	1
0.7166	1.804	1.7955	0.0084944	1
0.7333	1.799	1.794	0.0049762	1
0.75	1.799	1.7925	0.0064567	1
0.7666	1.794	1.7911	0.0029272	1
0.7833	1.794	1.7896	0.0044054	1
0.8	1.789	1.7881	0.00088228	1
0.8166	1.794	1.7867	0.0073491	1
0.8333	1.785	1.7852	-0.00017638	1
0.85	1.785	1.7837	0.0012969	1
0.8666	1.799	1.7822	0.01676	1
0.8833	1.78	1.7808	-0.00076902	1
0.9	1.78	1.7793	0.00070061	1
0.9166	1.78	1.7778	0.0021602	1
0.9333	1.789	1.7764	0.012627	1
0.95	1.775	1.7749	9.3447E-005	1
0.9666	1.775	1.7735	0.0015495	1
0.9833	1.765	1.772	-0.0069869	1
1	1.775	1.7705	0.0044754	1
1.2	1.741	1.7531	-0.012104	1
1.4	1.722	1.7359	-0.013856	1
1.6	1.698	1.7188	-0.020777	1
1.8	1.684	1.7019	-0.017866	1
2	1.655	1.6851	-0.030121	1
2.2	1.641	1.6685	-0.027542	1
2.4	1.621	1.6521	-0.031125	1
2.6	1.607	1.6359	-0.02887	1
2.8	1.583	1.6198	-0.036775	1
3	1.564	1.6038	-0.039838	1
3.2	1.545	1.5881	-0.043058	1
3.4	1.535	1.5724	-0.037433	1
3.6	1.516	1.557	-0.040962	1
3.8	1.506	1.5416	-0.035643	1
4	1.487	1.5265	-0.039475	1
4.2	1.468	1.5115	-0.043456	1
4.4	1.453	1.4966	-0.043585	1
4.6	1.444	1.4819	-0.03786	1
4.8	1.429	1.4673	-0.03828	1
5	1.41	1.4528	-0.042844	1
5.2	1.396	1.4385	-0.042549	1
5.4	1.377	1.4244	-0.047396	1
5.6	1.367	1.4104	-0.043381	1
5.8	1.353	1.3965	-0.043504	1
6	1.334	1.3828	-0.048764	1

6.2	1.319	1.3692	-0.050159	1
6.4	1.31	1.3557	-0.045688	1
6.6	1.286	1.3423	-0.05635	1
6.8	1.276	1.3291	-0.053142	1
7	1.271	1.3161	-0.045065	1
7.2	1.252	1.3031	-0.051116	1
7.4	1.242	1.2903	-0.048295	1
7.6	1.228	1.2776	-0.0496	1
7.8	1.204	1.265	-0.06103	1
8	1.19	1.2526	-0.062583	1
8.2	1.194	1.2403	-0.046259	1
8.4	1.175	1.2281	-0.053056	1
8.6	1.166	1.216	-0.049974	1
8.8	1.156	1.204	-0.04801	1
9	1.146	1.1922	-0.046164	1
9.2	1.127	1.1804	-0.053434	1
9.4	1.118	1.1688	-0.05082	1
9.6	1.103	1.1573	-0.05432	1
9.8	1.089	1.1459	-0.056933	1
10	1.089	1.1347	-0.045658	1
11	1.031	1.0799	-0.048927	1
12	0.978	1.0278	-0.049835	1
13	0.935	0.97826	-0.043257	1
14	0.892	0.93107	-0.039069	1
15	0.849	0.88616	-0.037158	1
16	0.796	0.84341	-0.047413	1
17	0.767	0.80273	-0.035731	1
18	0.724	0.76401	-0.04001	1
19	0.695	0.72716	-0.032157	1
20	0.667	0.69208	-0.025082	1
21	0.643	0.6587	-0.015699	1
22	0.614	0.62693	-0.012926	1
23	0.585	0.59669	-0.011685	1
24	0.566	0.5679	-0.0019034	1
25	0.532	0.54051	-0.0085099	1
26	0.513	0.51444	-0.0014378	1
27	0.494	0.48962	0.0043766	1
28	0.47	0.46601	0.0039941	1
29	0.451	0.44353	0.0074724	1
30	0.441	0.42213	0.018866	1
31	0.422	0.40177	0.020229	1
32	0.417	0.38239	0.034608	1
33	0.403	0.36395	0.039053	1
34	0.374	0.34639	0.027609	1
35	0.364	0.32968	0.034317	1
36	0.359	0.31378	0.04522	1
37	0.345	0.29864	0.046355	1
38	0.331	0.28424	0.046761	1
39	0.316	0.27053	0.045472	1
40	0.311	0.25748	0.053521	1
41	0.297	0.24506	0.051941	1
42	0.283	0.23324	0.049761	1
43	0.278	0.22199	0.056012	1
44	0.263	0.21128	0.05172	1
45	0.259	0.20109	0.057911	1
46	0.249	0.19139	0.057611	1
47	0.244	0.18216	0.061843	1
48	0.235	0.17337	0.061629	1
49	0.22	0.16501	0.054992	1
50	0.22	0.15705	0.062951	1

51	0.211	0.14947	0.061527	1
52	0.206	0.14226	0.063737	1
53	0.201	0.1354	0.065599	1
54	0.187	0.12887	0.05813	1
55	0.187	0.12265	0.064346	1
56	0.182	0.11674	0.065263	1
57	0.177	0.11111	0.065894	1
58	0.163	0.10575	0.057253	1
59	0.167	0.10065	0.066354	1
60	0.163	0.095792	0.067208	1
61	0.158	0.091171	0.066829	1
62	0.153	0.086773	0.066227	1
63	0.148	0.082588	0.065412	1
64	0.139	0.078604	0.060396	1
65	0.143	0.074812	0.068188	1
66	0.139	0.071204	0.067796	1
67	0.134	0.067769	0.066231	1
68	0.134	0.0645	0.0695	1
69	0.124	0.061389	0.062611	1
70	0.129	0.058428	0.070572	1
71	0.119	0.055609	0.063391	1
72	0.119	0.052927	0.066073	1
73	0.119	0.050374	0.068626	1
74	0.115	0.047944	0.067056	1
75	0.115	0.045632	0.069368	1
76	0.11	0.04343	0.06657	1
77	0.11	0.041336	0.068664	1
78	0.105	0.039342	0.065658	1
79	0.105	0.037444	0.067556	1
80	0.095	0.035638	0.059362	1
81	0.1	0.033919	0.066081	1
82	0.1	0.032283	0.067717	1
83	0.095	0.030726	0.064274	1
84	0.095	0.029243	0.065757	1

==

RESULTS FROM VISUAL CURVE MATCHING

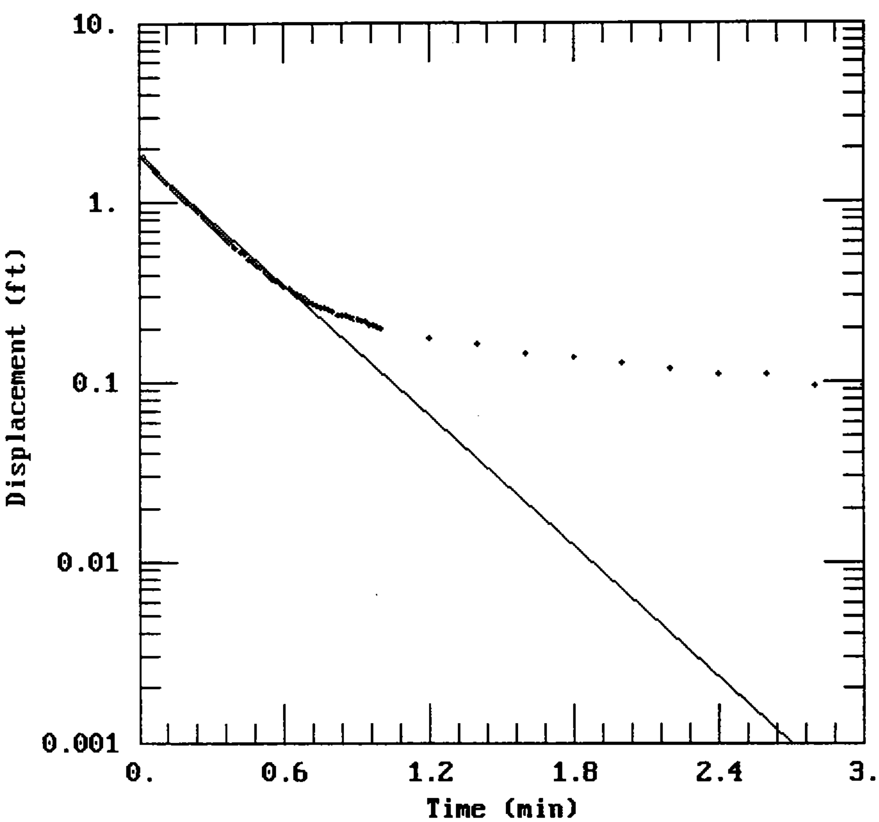
VISUAL MATCH PARAMETER ESTIMATES

```
          Estimate
   K  =   1.4660E-004 cm/sec
   y0 =   1.8966E+000 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-5, SLUG-OUT TEST



DATA SET:
MW-5.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 1.98 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 19.87 ft
H = 7.99 ft

PARAMETER ESTIMATES:
K = 0.003027 cm/sec
y0 = 1.796 ft

AQTESOLV

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A Q T E S O L V   R E S U L T S

Version 2.10

Developed by Glenn M. Duffield, HydroSOLVE, Inc.
(c) 1988-1995 Geraghty & Miller, Inc.

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TEST DESCRIPTION

```
Data set........... MW-5.DAT
Output file........ MW-5.OUT
Data set title..... MW-5, SLUG-OUT TEST
Company............ Brown & Root Environmental
Project............ 7387
Client............. Navy CLEAN
Location........... MCRD Parris Island, SC
Test date.......... 11/16/96

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.98
   Radius of well casing............ 0.086
   Radius of wellbore............... 0.2
   Aquifer saturated thickness...... 19.87
   Well screen length............... 10
   Static height of water in well... 7.99
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.1311
   Effective wellbore radius........ 0.2
   Log(Re/Rw)....................... 2.499
   Constants A, B and C............. 3.074 ,  0.494,  0.000
   No. of observations.............. 133
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==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
K =	3.0266E-003	+/-	5.3097E-005 cm/sec
y0 =	1.7963E+000	+/-	1.8622E-002 ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated

weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals.............. 133
Number of estimated parameters.... 2
Degrees of freedom............... 131
Residual mean.................... 0.02705
Residual standard deviation....... 0.05257
Residual variance................ 0.002764

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0166	1.809	1.7154	0.093577	1
0.025	1.741	1.6759	0.065113	1
0.0333	1.693	1.6377	0.055283	1
0.0416	1.631	1.6004	0.030584	1
0.05	1.593	1.5635	0.02947	1
0.0583	1.549	1.5279	0.021081	1
0.0666	1.506	1.4931	0.012882	1
0.075	1.473	1.4587	0.014294	1
0.0833	1.434	1.4255	0.0085183	1
0.0916	1.396	1.393	0.0029855	1
0.1	1.362	1.3609	0.001091	1
0.1083	1.329	1.3299	-0.00091258	1
0.1166	1.3	1.2996	0.00037788	1
0.125	1.266	1.2697	-0.0036691	1
0.1333	1.233	1.2408	-0.0077507	1
0.1416	1.204	1.2125	-0.0084911	1
0.15	1.175	1.1845	-0.0095462	1
0.1583	1.146	1.1576	-0.011567	1
0.1666	1.118	1.1312	-0.013202	1
0.175	1.089	1.1051	-0.01613	1
0.1833	1.065	1.08	-0.014959	1
0.1916	1.036	1.0554	-0.019362	1
0.2	1.012	1.031	-0.019039	1
0.2083	0.988	1.0076	-0.019555	1
0.2166	0.959	0.98461	-0.025607	1
0.225	0.935	0.96191	-0.026914	1
0.2333	0.906	0.94001	-0.034005	1
0.2416	0.887	0.9186	-0.031596	1
0.25	0.863	0.89742	-0.034424	1
0.2583	0.844	0.87698	-0.032984	1
0.2666	0.82	0.85701	-0.03701	1
0.275	0.801	0.83726	-0.036258	1
0.2833	0.782	0.81819	-0.036188	1
0.2916	0.762	0.79955	-0.037553	1
0.3	0.743	0.78113	-0.038125	1
0.3083	0.724	0.76333	-0.039334	1
0.3166	0.705	0.74595	-0.040948	1
0.325	0.69	0.72876	-0.038756	1
0.3333	0.671	0.71216	-0.041158	1
0.35	0.643	0.6799	-0.036898	1
0.3666	0.614	0.64928	-0.035279	1
0.3833	0.585	0.61987	-0.034868	1
0.4	0.561	0.59179	-0.030788	1
0.4166	0.532	0.56514	-0.033138	1
0.4333	0.513	0.53954	-0.026538	1

0.45	0.484	0.5151	-0.031097	1
0.4666	0.47	0.4919	-0.021901	1
0.4833	0.451	0.46962	-0.018618	1
0.5	0.436	0.44834	-0.012345	1
0.5166	0.417	0.42815	-0.011154	1
0.5333	0.398	0.40876	-0.010759	1
0.55	0.379	0.39024	-0.011243	1
0.5666	0.369	0.37267	-0.0036689	1
0.5833	0.355	0.35579	-0.00078743	1
0.6	0.345	0.33967	0.0053293	1
0.6166	0.335	0.32437	0.010626	1
0.6333	0.321	0.30968	0.01132	1
0.65	0.311	0.29565	0.015348	1
0.6666	0.302	0.28234	0.019662	1
0.6833	0.292	0.26955	0.022452	1
0.7	0.283	0.25734	0.025662	1
0.7166	0.273	0.24575	0.027251	1
0.7333	0.268	0.23462	0.033383	1
0.75	0.259	0.22399	0.035011	1
0.7666	0.259	0.2139	0.045098	1
0.7833	0.254	0.20421	0.049788	1
0.8	0.249	0.19496	0.054038	1
0.8166	0.239	0.18618	0.052818	1
0.8333	0.239	0.17775	0.061252	1
0.85	0.239	0.1697	0.069304	1
0.8666	0.23	0.16205	0.067946	1
0.8833	0.225	0.15471	0.070287	1
0.9	0.225	0.14771	0.077295	1
0.9166	0.22	0.14105	0.078947	1
0.9333	0.22	0.13466	0.085336	1
0.95	0.211	0.12856	0.082436	1
0.9666	0.211	0.12277	0.088226	1
0.9833	0.206	0.11721	0.088788	1
1	0.201	0.1119	0.089097	1
1.2	0.177	0.064229	0.11277	1
1.4	0.163	0.036866	0.12613	1
1.6	0.143	0.02116	0.12184	1
1.8	0.139	0.012145	0.12685	1
2	0.129	0.0069711	0.12203	1
2.2	0.119	0.0040012	0.115	1
2.4	0.11	0.0022966	0.1077	1
2.6	0.11	0.0013182	0.10868	1
2.8	0.095	0.0007566	0.094243	1
3	0.095	0.00043427	0.094566	1
3.2	0.095	0.00024926	0.094751	1
3.4	0.081	0.00014307	0.080857	1
3.6	0.086	8.2117E-005	0.085918	1
3.8	0.081	4.7133E-005	0.080953	1
4	0.076	2.7053E-005	0.075973	1
4.2	0.071	1.5528E-005	0.070984	1
4.4	0.067	8.9125E-006	0.066991	1
4.6	0.071	5.1155E-006	0.070995	1
4.8	0.067	2.9362E-006	0.066997	1
5	0.057	1.6853E-006	0.056998	1
5.2	0.057	9.6731E-007	0.056999	1
5.4	0.057	5.5521E-007	0.056999	1
5.6	0.047	3.1867E-007	0.047	1
5.8	0.047	1.8291E-007	0.047	1
6	0.052	1.0499E-007	0.052	1
6.2	0.052	6.0259E-008	0.052	1

6.4	0.052	3.4587E-008	0.052	1
6.6	0.052	1.9852E-008	0.052	1
6.8	0.043	1.1395E-008	0.043	1
7	0.043	6.5402E-009	0.043	1
7.2	0.038	3.7539E-009	0.038	1
7.4	0.033	2.1546E-009	0.033	1
7.6	0.038	1.2367E-009	0.038	1
7.8	0.033	7.0983E-010	0.033	1
8	0.038	4.0742E-010	0.038	1
8.2	0.043	2.3385E-010	0.043	1
8.4	0.038	1.3422E-010	0.038	1
8.6	0.028	7.7041E-011	0.028	1
8.8	0.023	4.4219E-011	0.023	1
9	0.028	2.5381E-011	0.028	1
9.2	0.033	1.4568E-011	0.033	1
9.4	0.033	8.3616E-012	0.033	1
9.6	0.028	4.7993E-012	0.028	1
9.8	0.023	2.7547E-012	0.023	1
10	0.028	1.5811E-012	0.028	1
11	0.019	9.8496E-014	0.019	1
12	0.014	6.1359E-015	0.014	1
13	0.014	3.8224E-016	0.014	1
14	0.019	2.3812E-017	0.019	1
15	0.014	1.4834E-018	0.014	1
16	0.014	9.2408E-020	0.014	1
17	0.009	5.7566E-021	0.009	1
18	0.014	3.5861E-022	0.014	1
19	0.004	2.234E-023	0.004	1

==

RESULTS FROM VISUAL CURVE MATCHING

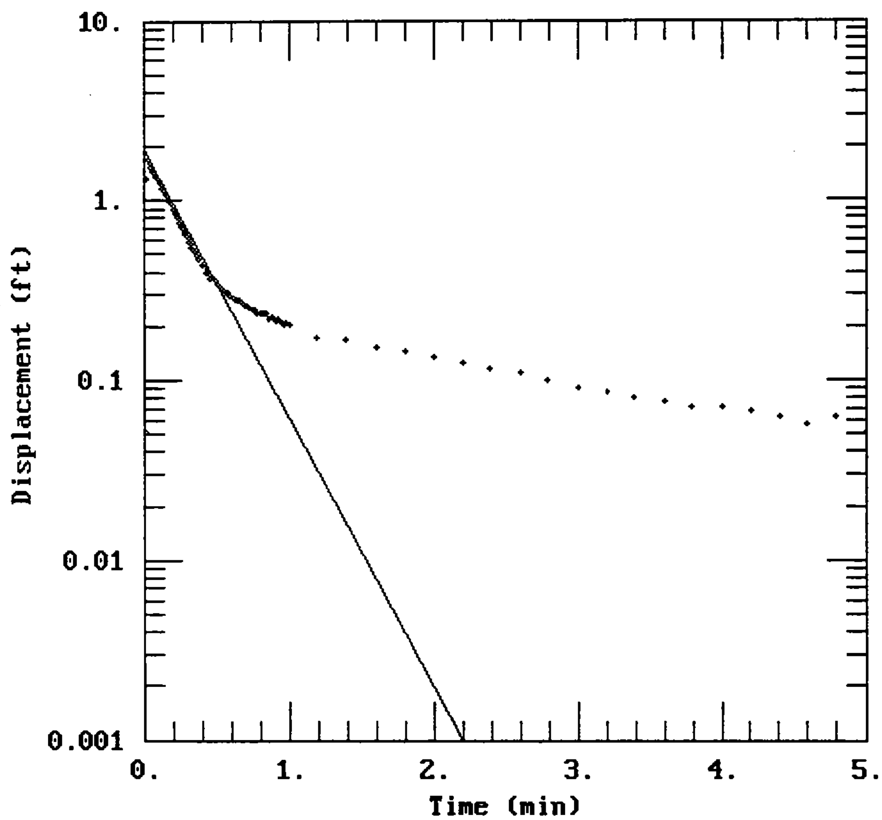
VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	3.0266E-003 cm/sec
y0 =	1.7963E+000 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-6, SLUG-OUT TEST



DATA SET:
MW-6.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 1.86 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 19.65 ft
H = 8.82 ft

PARAMETER ESTIMATES:
K = 0.003818 cm/sec
y0 = 1.887 ft

AQTESOLV

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

                        A Q T E S O L V   R E S U L T S
                                  Version 2.10

               Developed by Glenn M. Duffield, HydroSOLVE, Inc.
                    (c) 1988-1995  Geraghty & Miller, Inc.

01/17/97                                                                10:10:28

================================================================================
                                TEST DESCRIPTION

Data set........... MW-6.DAT
Output file........ MW-6.OUT
Data set title..... MW-6, SLUG-OUT TEST
Company............ Brown & Root Environmental
Project............ 7387
Client............. Navy CLEAN
Location........... MCRD Parris Island, SC
Test date.......... 11/16/96

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.86
   Radius of well casing............ 0.086
   Radius of wellbore............... 0.2
   Aquifer saturated thickness...... 19.65
   Well screen length............... 10
   Static height of water in well... 8.82
   Gravel pack porosity............. 0.3
   Effective well casing radius..... 0.1311
   Effective wellbore radius........ 0.2
   Log(Re/Rw)....................... 2.555
   Constants A, B and C............. 3.074 ,   0.494,   0.000
   No. of observations.............. 136

================================================================================
                                ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

================================================================================
                      RESULTS FROM STATISTICAL CURVE MATCHING


STATISTICAL MATCH PARAMETER ESTIMATES

           Estimate          Std. Error
   K  =   2.9974E-003 +/-   1.6504E-004 cm/sec
   y0 =   1.5683E+000 +/-   4.9346E-002 ft


ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
```

weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals...............	136
Number of estimated parameters....	2
Degrees of freedom................	134
Residual mean.....................	0.02274
Residual standard deviation.......	0.149
Residual variance.................	0.02221

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0083	1.861	1.5337	0.32733	1
0.0166	0.052	1.4998	-1.4478	1
0.025	1.324	1.4663	-0.14231	1
0.0333	1.689	1.4339	0.25506	1
0.0416	1.607	1.4023	0.20471	1
0.05	1.545	1.371	0.17403	1
0.0583	1.506	1.3407	0.1653	1
0.0666	1.463	1.3111	0.15189	1
0.075	1.425	1.2818	0.14318	1
0.0833	1.391	1.2535	0.13747	1
0.0916	1.353	1.2259	0.12714	1
0.1	1.319	1.1985	0.12053	1
0.1083	1.286	1.172	0.11398	1
0.1166	1.247	1.1461	0.10085	1
0.125	1.218	1.1205	0.097455	1
0.1333	1.18	1.0958	0.084191	1
0.1416	1.146	1.0716	0.07438	1
0.15	1.113	1.0477	0.065317	1
0.1583	1.079	1.0246	0.054444	1
0.1666	1.05	1.0019	0.04806	1
0.175	1.017	0.97956	0.03744	1
0.1833	0.983	0.95794	0.025064	1
0.1916	0.954	0.93679	0.017209	1
0.2	0.926	0.91587	0.010135	1
0.2083	0.897	0.89565	0.0013516	1
0.2166	0.868	0.87588	-0.0078776	1
0.225	0.839	0.85631	-0.017313	1
0.2333	0.81	0.83741	-0.02741	1
0.2416	0.782	0.81893	-0.036925	1
0.25	0.758	0.80063	-0.042633	1
0.2583	0.734	0.78296	-0.048959	1
0.2666	0.705	0.76568	-0.060676	1
0.275	0.69	0.74857	-0.058573	1
0.2833	0.662	0.73205	-0.070049	1
0.2916	0.643	0.71589	-0.072889	1
0.3	0.633	0.6999	-0.066898	1
0.3083	0.609	0.68445	-0.075449	1
0.3166	0.59	0.66934	-0.07934	1
0.325	0.571	0.65439	-0.083389	1
0.3333	0.547	0.63994	-0.092944	1
0.35	0.518	0.61184	-0.093838	1
0.3666	0.499	0.58512	-0.086125	1
0.3833	0.465	0.55943	-0.094427	1
0.4	0.441	0.53486	-0.093858	1
0.4166	0.422	0.51151	-0.089505	1

0.4333	0.398	0.48904	-0.091041	1
0.45	0.393	0.46756	-0.074563	1
0.4666	0.369	0.44715	-0.078149	1
0.4833	0.364	0.42751	-0.06351	1
0.5	0.355	0.40873	-0.053735	1
0.5166	0.345	0.39089	-0.045889	1
0.5333	0.331	0.37372	-0.042722	1
0.55	0.321	0.35731	-0.036309	1
0.5666	0.311	0.34171	-0.030708	1
0.5833	0.307	0.3267	-0.019701	1
0.6	0.297	0.31235	-0.015353	1
0.6166	0.287	0.29871	-0.011715	1
0.6333	0.283	0.2856	-0.0025958	1
0.65	0.278	0.27305	0.0049471	1
0.6666	0.278	0.26113	0.016869	1
0.6833	0.268	0.24966	0.018337	1
0.7	0.263	0.2387	0.024302	1
0.7166	0.259	0.22828	0.030724	1
0.7333	0.254	0.21825	0.03575	1
0.75	0.249	0.20867	0.040335	1
0.7666	0.249	0.19955	0.049445	1
0.7833	0.239	0.19079	0.048209	1
0.8	0.239	0.18241	0.056589	1
0.8166	0.235	0.17445	0.060553	1
0.8333	0.235	0.16679	0.068214	1
0.85	0.235	0.15946	0.075539	1
0.8666	0.22	0.1525	0.067502	1
0.8833	0.225	0.1458	0.079199	1
0.9	0.22	0.1394	0.080602	1
0.9166	0.215	0.13331	0.081689	1
0.9333	0.22	0.12746	0.092544	1
0.95	0.211	0.12186	0.089141	1
0.9666	0.206	0.11654	0.089462	1
0.9833	0.211	0.11142	0.09958	1
1	0.206	0.10653	0.099473	1
1.2	0.172	0.062211	0.10979	1
1.4	0.167	0.036331	0.13067	1
1.6	0.153	0.021217	0.13178	1
1.8	0.143	0.01239	0.13061	1
2	0.134	0.0072359	0.12676	1
2.2	0.124	0.0042257	0.11977	1
2.4	0.115	0.0024678	0.11253	1
2.6	0.11	0.0014412	0.10856	1
2.8	0.1	0.00084163	0.099158	1
3	0.091	0.0004915	0.090508	1
3.2	0.086	0.00028703	0.085713	1
3.4	0.081	0.00016763	0.080832	1
3.6	0.076	9.7892E-005	0.075902	1
3.8	0.071	5.7168E-005	0.070943	1
4	0.071	3.3386E-005	0.070967	1
4.2	0.067	1.9497E-005	0.066981	1
4.4	0.062	1.1386E-005	0.061989	1
4.6	0.057	6.6494E-006	0.056993	1
4.8	0.062	3.8832E-006	0.061996	1
5	0.052	2.2677E-006	0.051998	1
5.2	0.052	1.3243E-006	0.051999	1
5.4	0.047	7.734E-007	0.046999	1
5.6	0.043	4.5166E-007	0.043	1
5.8	0.043	2.6377E-007	0.043	1
6	0.047	1.5404E-007	0.047	1

6.2	0.043	8.9957E-008	0.043	1
6.4	0.038	5.2534E-008	0.038	1
6.6	0.033	3.0679E-008	0.033	1
6.8	0.033	1.7916E-008	0.033	1
7	0.033	1.0463E-008	0.033	1
7.2	0.033	6.1104E-009	0.033	1
7.4	0.028	3.5684E-009	0.028	1
7.6	0.033	2.0839E-009	0.033	1
7.8	0.028	1.217E-009	0.028	1
8	0.023	7.1071E-010	0.023	1
8.2	0.023	4.1505E-010	0.023	1
8.4	0.019	2.4239E-010	0.019	1
8.6	0.023	1.4155E-010	0.023	1
8.8	0.023	8.2665E-011	0.023	1
9	0.019	4.8276E-011	0.019	1
9.2	0.019	2.8193E-011	0.019	1
9.4	0.019	1.6464E-011	0.019	1
9.6	0.019	9.615E-012	0.019	1
9.8	0.014	5.6151E-012	0.014	1
10	0.019	3.2791E-012	0.019	1
11	0.014	2.2274E-013	0.014	1
12	0.009	1.513E-014	0.009	1
13	0.014	1.0277E-015	0.014	1
14	0.009	6.9806E-017	0.009	1
15	0.009	4.7416E-018	0.009	1
16	0.009	3.2208E-019	0.009	1
17	0.009	2.1877E-020	0.009	1
18	0.009	1.486E-021	0.009	1
19	0.004	1.0094E-022	0.004	1
20	0.009	6.8564E-024	0.009	1
21	0.009	4.6573E-025	0.009	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	3.8182E-003 cm/sec
y0 =	1.8870E+000 ft

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TABLE 4-1
GROUNDWATER ELEVATIONS
AVGAS PIPELINE, PAGE FIELD
MCRD PARRIS ISLAND, SOUTH CAROLINA
GWPD SITE # 15495

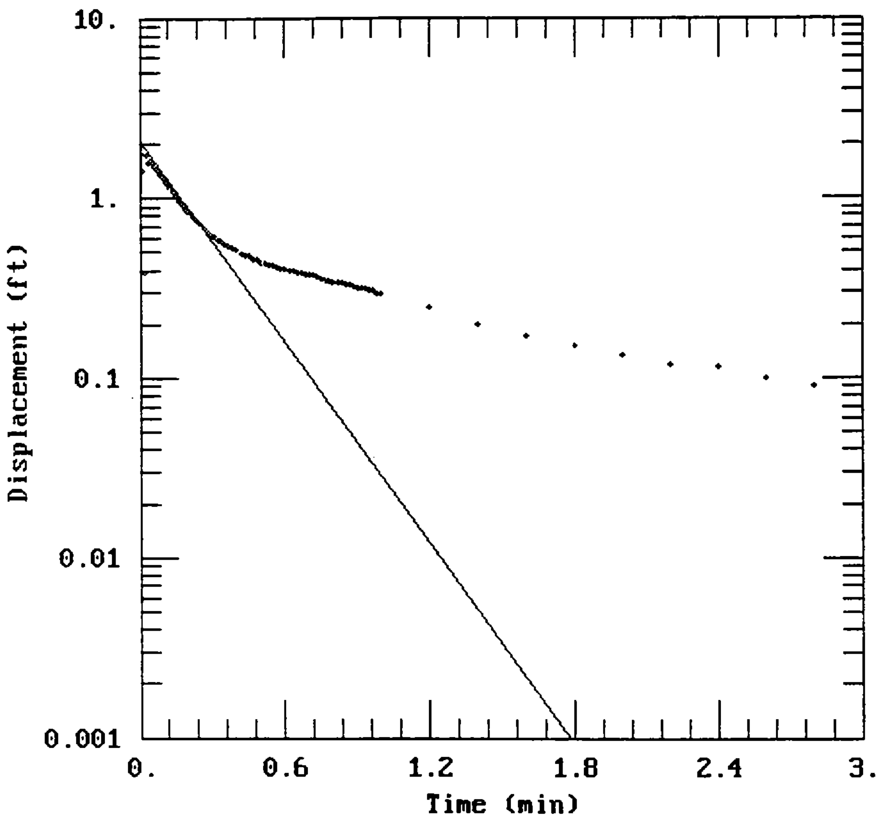
Well #	Total Depth of Well (ft)	Top of Casing Elevation (MSL)	Date Measured	Depth to Water (BTOC)	Groundwater Elevation (MSL)
MW-1	12.8	11.11	11/14/96	6.55	4.56
			11/15/96	6.58	4.53
			11/16/96	6.61	4.50
			11/17/96	6.66	4.45
			11/17/96	6.63	4.48
MW-2	13.1	8.04	11/14/96	4.73	3.31
			11/15/96	3.48	4.56
			11/16/96	3.45	4.59
			11/17/96	3.48	4.56
			11/17/96	3.45	4.59
MW-3	13.4	11.00	11/14/96	6.45	4.55
			11/15/96	6.56	4.44
			11/16/96	6.51	4.49
			11/17/96	6.56	4.44
			11/17/96	6.51	4.49
MW-4	12.5	10.78	11/14/96	NM	NM
			11/15/96	6.35	4.43
			11/16/96	NM	NM
			11/17/96	6.42	4.36
			11/17/96	6.40	4.38
MW-5	12.5	11.65	11/14/96	6.95	4.70
			11/15/96	7.08	4.57
			11/16/96	7.03	4.62
			11/17/96	7.08	4.57
			11/17/96	7.03	4.62
MW-6	13.5	11.46	11/14/96	6.75	4.71
			11/15/96	6.85	4.61
			11/16/96	6.85	4.61
			11/17/96	6.88	4.58
			11/17/96	6.86	4.60

PAI-AVGAS-1C	15.0	10.4	11/14/96	NM	NM
			11/15/96	5.51	4.89
			11/16/96	5.41	4.99
			11/17/96	5.53	4.87
			11/17/96	6.47	3.93
PAI-AVGAS-2C	15.0	12.18	11/14/96	NM	NM
			11/15/96	7.05	5.13
			11/16/96	7.03	5.15
			11/17/96	7.07	5.11
			11/17/96	7.17	5.01

Notes:
MSL - Mean Sea Level
BTOC - Below Top of Casing
NA - Not Applicable

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-1, SLUG-OUT TEST



DATA SET:
MW-1.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

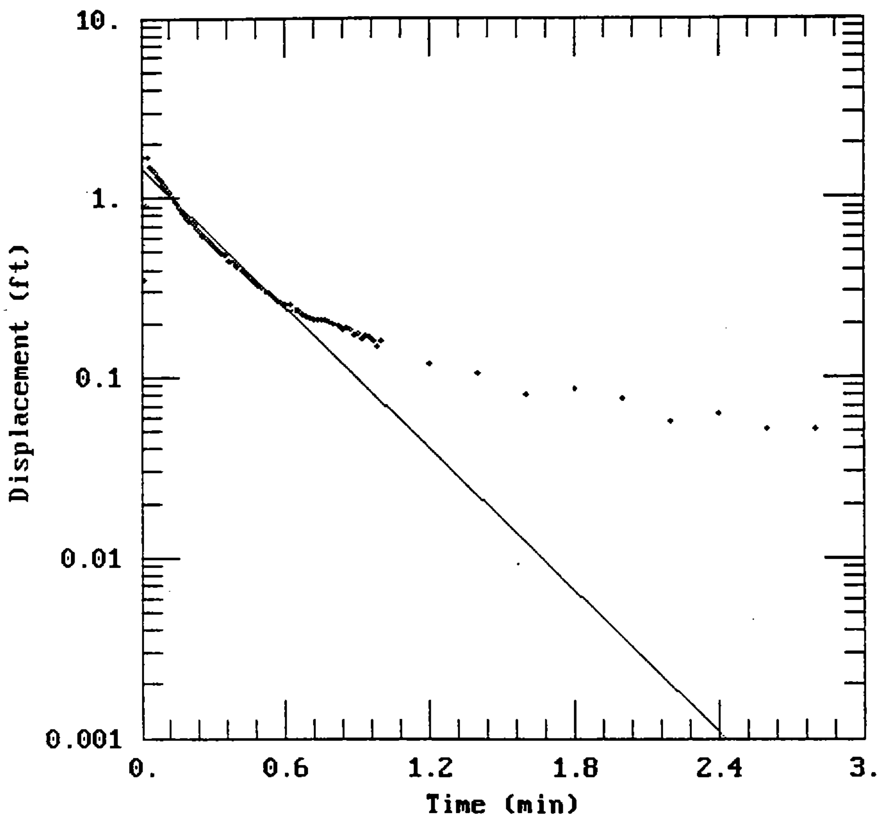
TEST DATA:
H0= 1.79 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 19.89 ft
H = 7.89 ft

PARAMETER ESTIMATES:
K = 0.004658 cm/sec
y0 = 2.029 ft

AQTESOLV

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-2, SLUG-OUT TEST



DATA SET:
MW-2.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

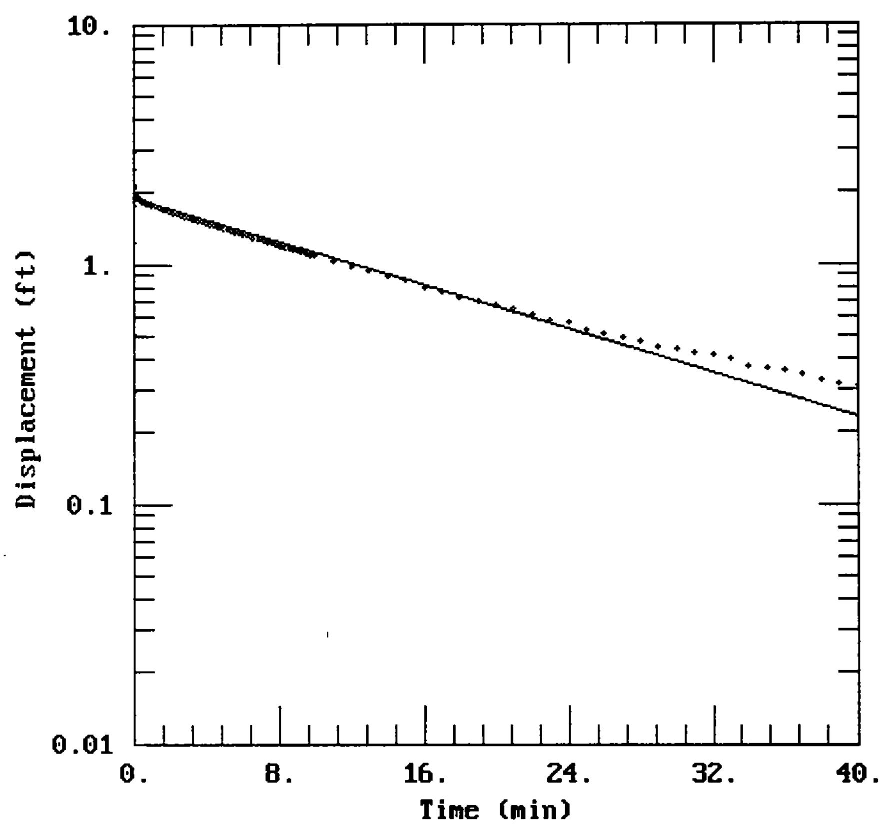
TEST DATA:
H0= 1.67 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 20.2 ft
H = 9. ft

PARAMETER ESTIMATES:
K = 0.003352 cm/sec
y0 = 1.442 ft

AQTESOLV

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-4, SLUG-OUT TEST



DATA SET:
MW-4.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

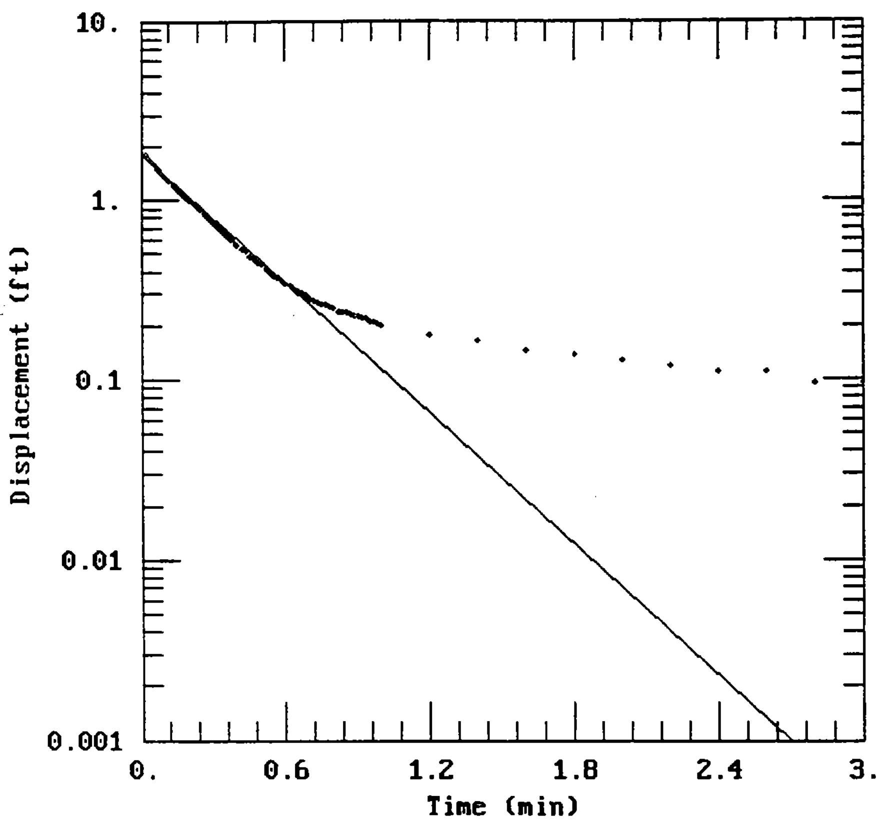
TEST DATA:
H0= 2.1 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 5. ft
b = 19.27 ft
H = 19.27 ft

PARAMETER ESTIMATES:
K = 0.0001466 cm/sec
y0 = 1.897 ft

AQTESOLV

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-5, SLUG-OUT TEST



DATA SET:
MW-5.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

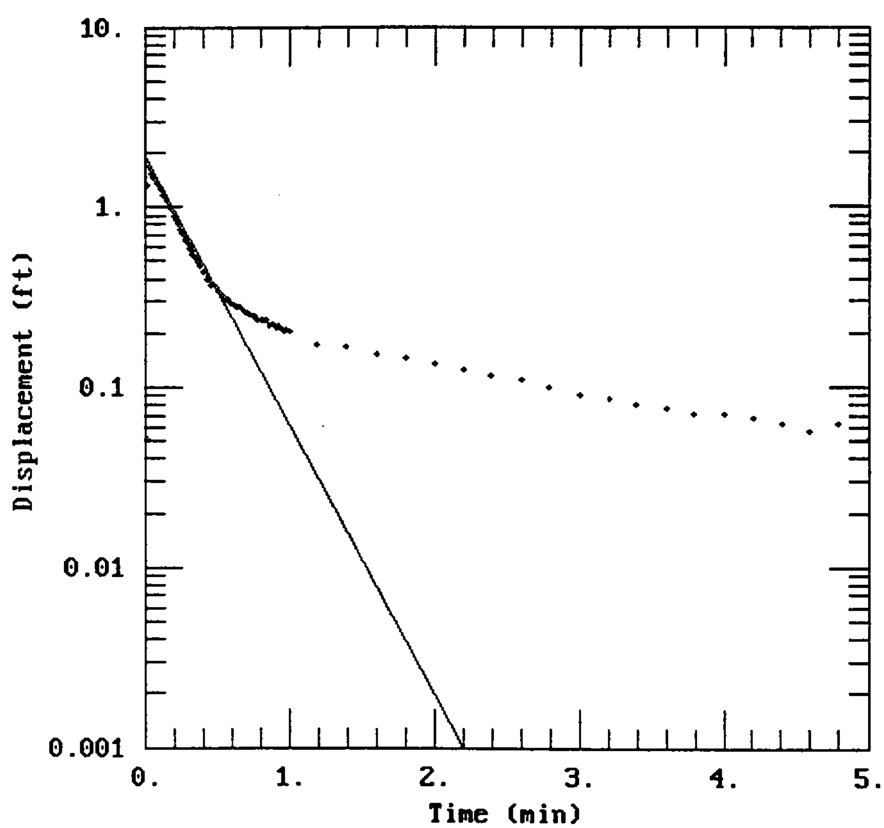
TEST DATA:
H0= 1.98 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 19.87 ft
H = 7.99 ft

PARAMETER ESTIMATES:
K = 0.003027 cm/sec
y0 = 1.796 ft

AQTESOLV

CLIENT: Navy CLEAN	COMPANY: Brown & Root Environmental
LOCATION: MCRD Parris Island, SC	PROJECT: 7387

MW-6, SLUG-OUT TEST



DATA SET:
MW-6.DAT
01/17/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 1.86 ft
r_c= 0.086 ft
r_w= 0.2 ft
L = 10. ft
b = 19.65 ft
H = 8.82 ft

PARAMETER ESTIMATES:
K = 0.003818 cm/sec
y0 = 1.887 ft

AQTESOLV

SLUG TEST DATA SET
SITE / JOB NO.:

Insert values into first table; use second table to build AQTESOLV data sets.

Site	D PARRIS ISLAND									
Well No.	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6				
Slug Test Date	11/15/96	11/17/96	11/15/96	11/16/96	11/16/96	11/16/96				
Slug In / Out	OUT	OUT	OUT	OUT	OUT	OUT				
Depth to SWL (ft)	6.6	3.45	6.51	6.41	7.06	6.87				
Initial Head Change (ft) (1)	1.79	1.67	2.1	2.1	1.98	1.86				
Well Radius (ft)	0.086	0.086	0.086	0.086	0.086	0.086				
Boring Radius (ft)	0.2	0.2	0.2	0.2	0.2	0.2				
Well Stickup (ft)	2.49	-0.35	2.66	2.68	2.93	2.52				
Filter Pack Porosity	0.3	0.3	0.3	0.3	0.3	0.3				
Top Screen Depth (ft)	2	2.8	3	18	2.12	3.17				
Bott. Screen Depth (ft)	12	12.8	13	23	12.12	13.17				
Aquifer Bott. Depth (ft)	24	24	24	24	24	24				

(1) Determined from Time vs. Head Change data.

AQTESOLV INPUT
(Units in Feet)

Well No.	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	0	0	0	0
Initial Displacement	1.79	1.67	2.1	2.1	1.98	1.86	0	0	0	0
Radius, Well	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086
Radius, Boring	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Saturated Thickness	19.89	20.2	20.15	20.27	19.87	19.65	0	0	0	0
Screen Length (2)	10	10	10	5	10	10	0	0	0	0
Height Water in Well	7.89	9	9.15	19.27	7.99	8.82	0	0	0	0
Is H > L ? (3)	No	No	No	Yes	No	No	Yes	Yes	Yes	Yes
If NO, enter filter pack porosity (decimal)	0.3	0.3	0.3		0.3	0.3				

(2) Screen lenght can not be greater than saturated thickness.
(3) If the height of the water in the well, H. is less than the screen length, L, then the filter pack porosity must be considered.

APPENDIX H

RISK ASSESSMENT

Parris Island, SC
Modeling Input for BENZENE

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — Version 1.3

Parris Island, SC
Benzene
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ or
0.02 → 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).

Variable* → Data used directly in model.
20 → Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	61.3	(ft/yr)
or		↑ or	
Hydraulic Conductivity	K	3.7E-03	(cm/sec)
Hydraulic Gradient	i	0.004	(ft/ft)
Porosity	n	0.25	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	11.0	(ft)
Transverse Dispersivity*	alpha y	1.1	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		↑ or	
Estimated Plume Length	Lp	200	(ft)

3. ADSORPTION

Retardation Factor*	R	1.5	(-)
or		↑ or	
Soil Bulk Density	rho	1.58	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	2.00E-03	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or		↑ or	
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	5.78	(mg/L)
Delta Nitrate*	NO3	17	(mg/L)
Observed Ferrous Iron*	Fe2+	11.3	(mg/L)
Delta Sulfate*	SO4	100	(mg/L)
Observed Methane*	CH4	0.414	(mg/L)

5. GENERAL

Modeled Area Length*	1700	(ft)
Modeled Area Width*	500	(ft)
Simulation Time*	50	(yr)

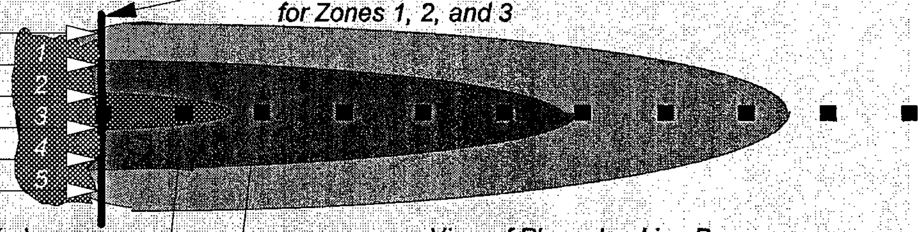
6. SOURCE DATA

Source Thickness in Sat.Zone* 20 (ft)

Source Zones:

Width* (ft)	Conc. (mg/L)*
30	0.179
30	1.75
30	1.84

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Source Decay (see Help):

SourceHalflife*	Infinite	(yr)
Soluble Mass	↑ or	
In NAPL, Soil	Infinite	(Kg)

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	.0		.0					.0		.0	.0
Dist. from Source (ft)	0	170	340	510	680	850	1020	1190	1360	1530	1700

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help

Recalculate This Sheet

Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

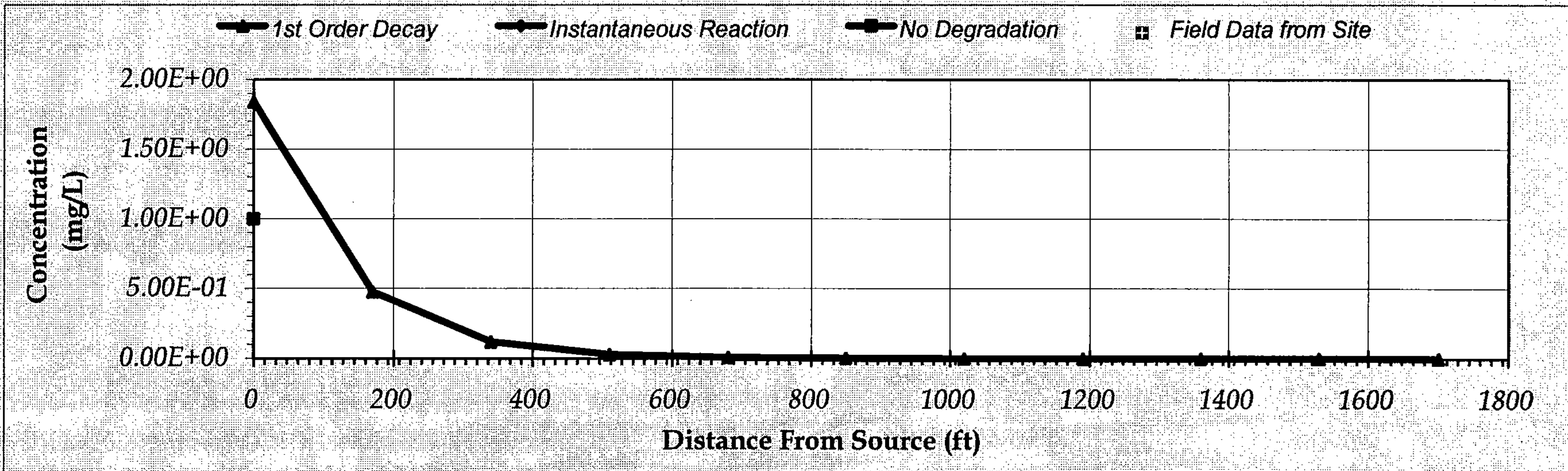
Parris Island, SC
Modeling Output for BENZENE

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

Current conditions - Benzene

Distance from Source (ft)

TYPE OF MODEL	0	170	340	510	680	850	1020	1190	1360	1530	1700
1st Order Decay	1.8400	0.4763	0.1181	0.0292	0.0073	0.0018	0.0005	0.0001	0.0000	0.0000	0.0000
Field Data from Site											



Calculate Animation

Time:

50 Years

Return to Input

Recalculate This Sheet

Parris Island, SC
Modeling Output for BENZENE

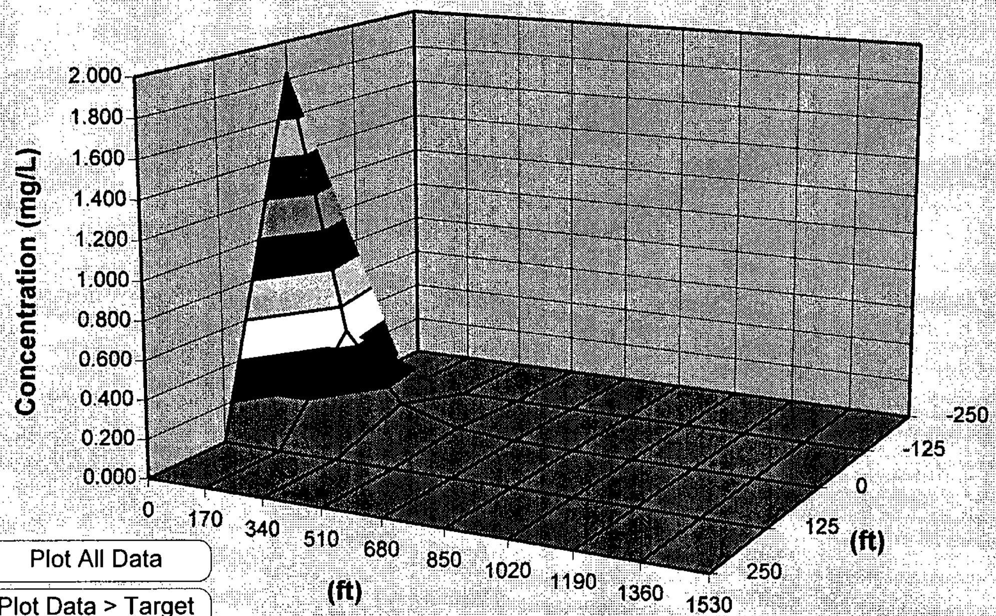
DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) / *Distance from Source (ft)*

	0	170	340	510	680	850	1020	1190	1360	1530	1700
250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
125	0.00000	0.00024	0.00064	0.00050	0.00025	0.00010	0.00004	0.00001	0.00000	0.00000	0.00000
0	1.84000	0.47635	0.11811	0.02918	0.00727	0.00183	0.00046	0.00012	0.00003	0.00001	2.01E-06
-125	0.00000	0.00024	0.00064	0.00050	0.00025	0.00010	0.00004	0.00001	0.00000	0.00000	0.00000
-250	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Model to Display:
No Degradation Model
1st Order Decay Model
Instantaneous Reaction Model

Time: **50 Years** Target Level: **0.005** mg/L Displayed Model: **1st Order Decay**



Plot All Data
Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	74.1	*(Kg)*
- Actual Plume Mass	5.0	*(Kg)*
= Plume Mass Removed by Biodeg	**69.1**	*(Kg)* (93 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	*Nitrate*	*Iron II*	*Sulfate*	*Methane*	
na	na	na	na	na	*(Kg)*

Original Mass In Source (Time = 0 Years)	Infinite	*(Kg)*
Mass in Source Now (Time = 50Years)	Infinite	*(Kg)*
Current Volume of Groundwater in Plume	12.2	*(ac-ft)*
Flowrate of Water Through Source Zone	1.055	*(ac-ft/yr)*

Mass HELP Recalculate

Plume Output. Parris Island, SC.

Parris Island, SC
Modeling Input for TOLUENE

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence *Version 1.3*

Parris Island, SC	
Toluene - current cond.	
Run Name	

Data Input Instructions:

115	1. Enter value directly....or
or 0.02	2. Calculate by filling in grey cells below. (To restore formulas, hit button below).
Variable*	Data used directly in model.
20	Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	*Vs*	61.3	*(ft/yr)*
or		or	
Hydraulic Conductivity	*K*	3.7E-03	*(cm/sec)*
Hydraulic Gradient	*i*	0.004	*(ft/ft)*
Porosity	*n*	0.25	*(-)*

2. DISPERSION

Longitudinal Dispersivity*	*alpha x*	11.0	*(ft)*
Transverse Dispersivity*	*alpha y*	1.1	*(ft)*
Vertical Dispersivity*	*alpha z*	0.0	*(ft)*
or		or	
Estimated Plume Length	*Lp*	200	*(ft)*

3. ADSORPTION

Retardation Factor*	*R*	2.7	*(-)*
or		or	
Soil Bulk Density	*rho*	1.58	*(kg/l)*
Partition Coefficient	*Koc*	134.89	*(L/kg)*
FractionOrganicCarbon	*foc*	2.00E-03	*(-)*

4. BIODEGRADATION

1st Order Decay Coeff*	*lambda*	1.2E+0	*(per yr)*
or		or	
Solute Half-Life	*t-half*	0.57	*(year)*
or Instantaneous Reaction Model			
Delta Oxygen*	*DO*	5.78	*(mg/L)*
Delta Nitrate*	*NO3*	17	*(mg/L)*
Observed Ferrous Iron*	*Fe2+*	11.3	*(mg/L)*
Delta Sulfate*	*SO4*	100	*(mg/L)*
Observed Methane*	*CH4*	0.414	*(mg/L)*

5. GENERAL

Modeled Area Length*	1700	*(ft)*
Modeled Area Width*	500	*(ft)*
Simulation Time*	50	*(yr)*

L W

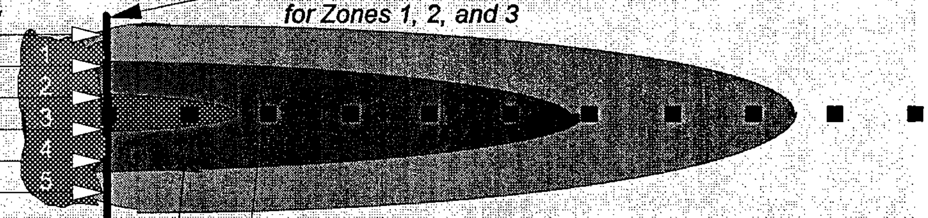
6. SOURCE DATA

Source Thickness in Sat.Zone* 20 *(ft)*

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

Source Zones:

Width* (ft)	Conc. (mg/L)*
30	0.066
30	0.659
30	1.57
30	0.659
30	0.066



View of Plume Looking Down

Source Decay (see Help):

SourceHalflife*	Infinite	*(yr)*
Soluble Mass	or	
In NAPL, Soil	Infinite	*(Kg)*

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)											
Dist. from Source (ft)	*0*	*170*	*340*	*510*	*680*	*850*	*1020*	*1190*	*1360*	*1530*	*1700*

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE

View Output

RUN ARRAY

View Output

Help

Recalculate This Sheet

Paste Example Dataset

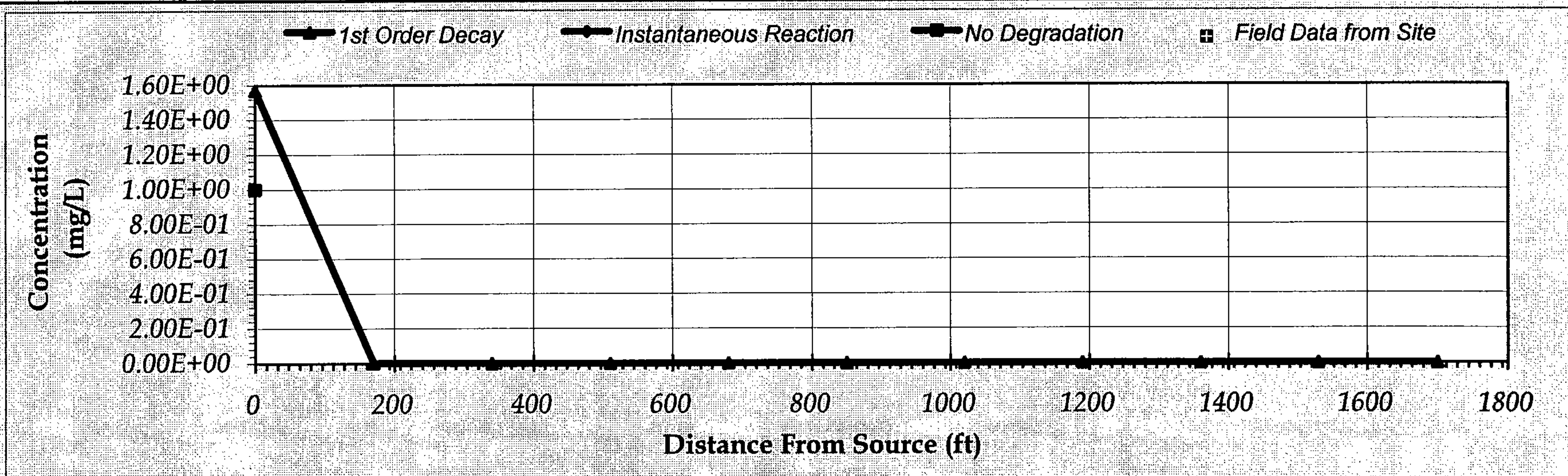
Restore Formulas for Vs, Dispersivities, R, lambda, other

Parris Island, SC
Modeling Output for TOLUENE

Toluene

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

	Distance from Source (ft)										
TYPE OF MODEL	0	170	340	510	680	850	1020	1190	1360	1530	1700
1st Order Decay	1.57E+00	1.85E-03	2.50E-06	3.54E-09	5.13E-12	7.55E-15	1.13E-17	1.69E-20	2.56E-23	3.90E-26	5.91E-29
Field Data from Site											



Calculate Animation

Time:

50 Years

Return to Input

Recalculate This Sheet

50

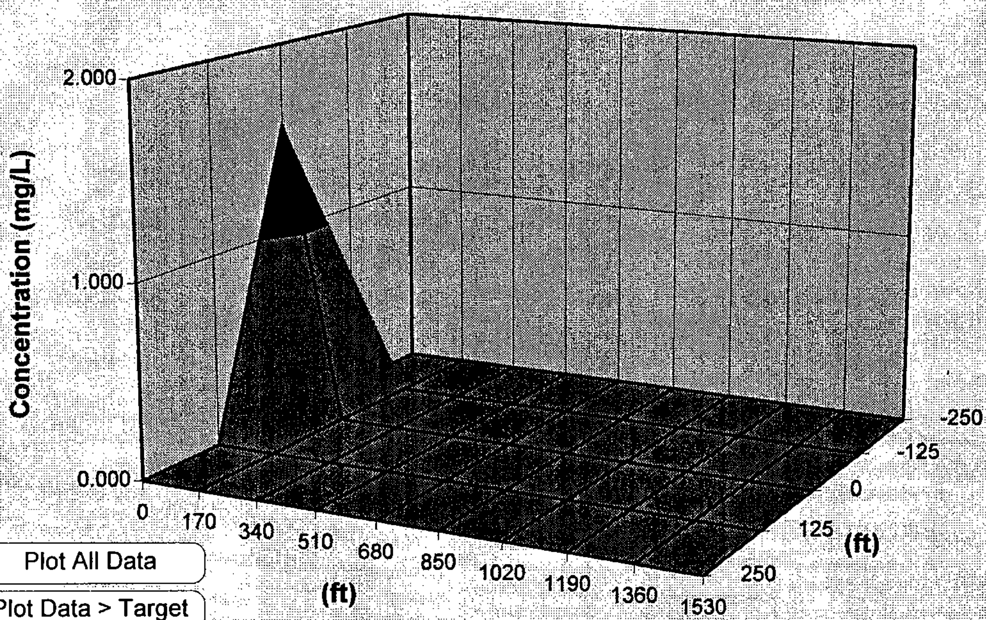
Parris Island, SC
Modeling Output for TOLUENE

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	170	340	510	680	850	1020	1190	1360	1530	1700
250	0.00E+00	0.00E+00	1.40E-17	2.56E-17	1.58E-18	2.54E-20	2.06E-22	1.11E-24	4.59E-27	1.57E-29	4.67E-32
125	0.00E+00	5.35E-07	8.43E-09	4.09E-11	1.30E-13	3.32E-16	7.44E-19	1.53E-21	2.97E-24	5.53E-27	9.91E-30
0	1.57E+00	1.85E-03	2.50E-06	3.54E-09	5.13E-12	7.55E-15	1.13E-17	1.69E-20	2.56E-23	3.90E-26	5.91E-29
-125	0.00E+00	5.35E-07	8.43E-09	4.09E-11	1.30E-13	3.32E-16	7.44E-19	1.53E-21	2.97E-24	5.53E-27	9.91E-30
-250	0.00E+00	0.00E+00	1.40E-17	2.56E-17	1.58E-18	2.54E-20	2.06E-22	1.11E-24	4.59E-27	1.57E-29	4.67E-32

Model to Display:
- *No Degradation Model*
- *1st Order Decay Model*
- *Instantaneous Reaction Model*

Time: **50 Years** Target Level: **1.000** mg/L Displayed Model: **1st Order Decay**



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	39.3	*(Kg)*
- Actual Plume Mass	1.8	*(Kg)*
= Plume Mass Removed by Biodeg	**37.4**	*(Kg)*
		(95 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	*Nitrate*	*Iron II*	*Sulfate*	*Methane*	
na	na	na	na	na	*(Kg)*

Original Mass In Source (Time = 0 Years)	Infinite	*(Kg)*
Mass in Source Now (Time = 50Years)	Infinite	*(Kg)*
Current Volume of Groundwater in Plume	2.4	*(ac-ft)*
Flowrate of Water Through Source Zone	1.055	*(ac-ft/yr)*

Mass HELP Recalculate

Parris Island, SC
Modeling Input for ETHYLBENZENE

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence *Version 1.3*

Parris Island, SC
Ethylbenzene
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
or 2. Calculate by filling in grey
0.02 cells below. (To restore formulas, hit button below).

Variable* → Data used directly in model.
20 → Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	61.3	(ft/yr)
or		or	
Hydraulic Conductivity	K	3.7E-03	(cm/sec)
Hydraulic Gradient	i	0.004	(ft/ft)
Porosity	n	0.25	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	11.0	(ft)
Transverse Dispersivity*	alpha y	1.1	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	200	(ft)

3. ADSORPTION

Retardation Factor*	R	1.5	(-)
or		or	
Soil Bulk Density	rho	1.58	(kg/l)
Partition Coefficient	Koc	95.49	(L/kg)
FractionOrganicCarbon	foc	2.00E-03	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	1.1E+0	(per yr)
or		or	
Solute Half-Life	t-half	0.62	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	5.78	(mg/L)
Delta Nitrate*	NO3	17	(mg/L)
Observed Ferrous Iron*	Fe2+	11.3	(mg/L)
Delta Sulfate*	SO4	100	(mg/L)
Observed Methane*	CH4	0.414	(mg/L)

5. GENERAL

Modeled Area Length*	1700	(ft)
Modeled Area Width*	500	(ft)
Simulation Time*	50	(yr)

L W

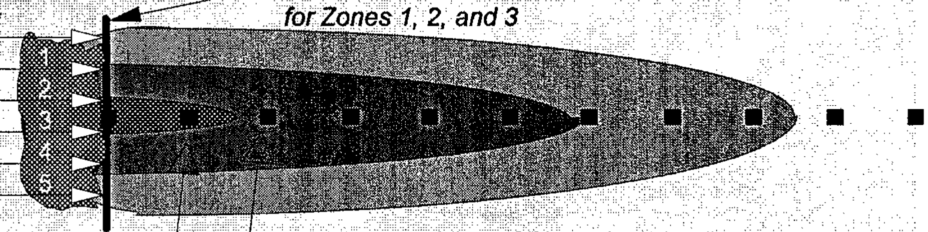
6. SOURCE DATA

Source Thickness in Sat.Zone* 20 (ft)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3

Source Zones:

Width* (ft)	Conc. (mg/L)*
30	0.0198
30	0.198
30	1.98
30	0.198
30	0.0198



View of Plume Looking Down

Source Decay (see Help):

SourceHalflife*	Infinite	(yr)
Soluble Mass	or	
In NAPL, Soil	Infinite	(Kg)

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)											
Dist. from Source (ft)	0	170	340	510	680	850	1020	1190	1360	1530	1700

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Recalculate This Sheet

View Output | View Output | Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

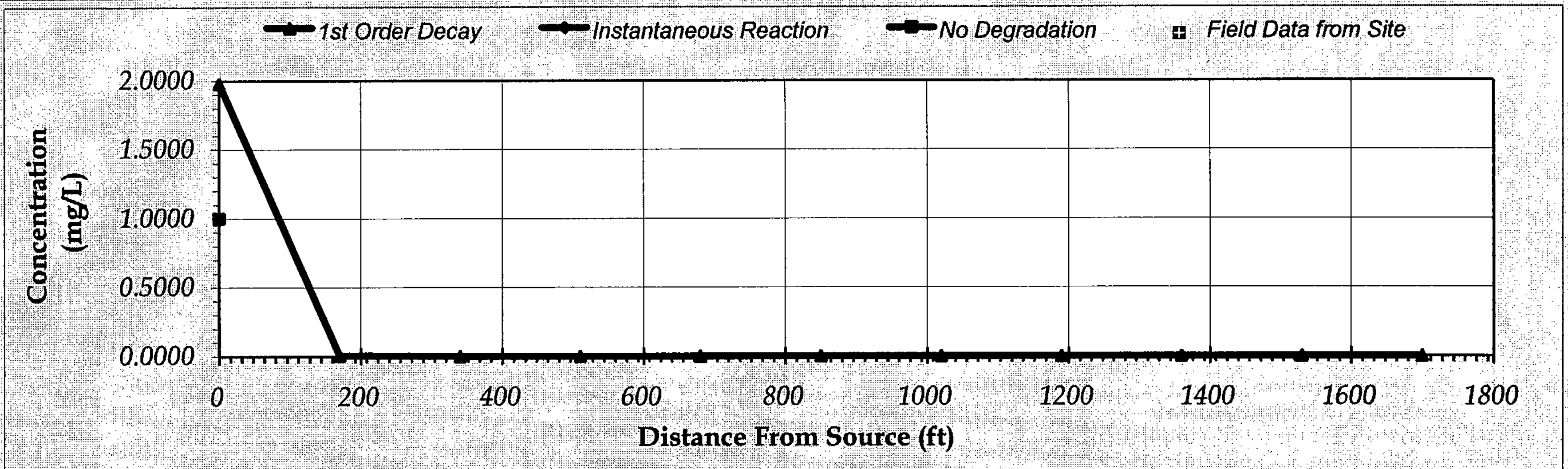
BIOSCREEN Input Screen. Parris Island, SC. 2/20/97 2:45 PM

Parris Island, SC
Modeling Output for ETHYLBENZENE

Ethylbenzene

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

	Distance from Source (ft)										
TYPE OF MODEL	0	170	340	510	680	850	1020	1190	1360	1530	1700
1st Order Decay	1.98E+00	7.03E-03	3.19E-05	1.59E-07	8.27E-10	4.41E-12	2.39E-14	1.31E-16	7.26E-19	4.04E-21	2.26E-23
Field Data from Site											



Calculate Animation

Time:

50 Years

Return to Input

Recalculate This Sheet

50

Parris Island, SC
Modeling Output for ETHYLBENZENE

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) / *Distance from Source (ft)*

Transverse Distance (ft)	0	170	340	510	680	850	1020	1190	1360	1530	1700
250	0.00E+00	0.00E+00	5.69E-17	3.83E-16	8.80E-17	5.43E-18	1.75E-19	3.83E-21	6.42E-23	8.85E-25	1.05E-26
125	0.00E+00	5.91E-07	3.58E-08	7.67E-10	1.10E-11	1.20E-13	1.09E-15	8.89E-18	6.68E-20	4.75E-22	3.25E-24
0	1.98E+00	7.03E-03	3.19E-05	1.59E-07	8.27E-10	4.41E-12	2.39E-14	1.31E-16	7.26E-19	4.04E-21	2.26E-23
-125	0.00E+00	5.91E-07	3.58E-08	7.67E-10	1.10E-11	1.20E-13	1.09E-15	8.89E-18	6.68E-20	4.75E-22	3.25E-24
-250	0.00E+00	0.00E+00	5.69E-17	3.83E-16	8.80E-17	5.43E-18	1.75E-19	3.83E-21	6.42E-23	8.85E-25	1.05E-26

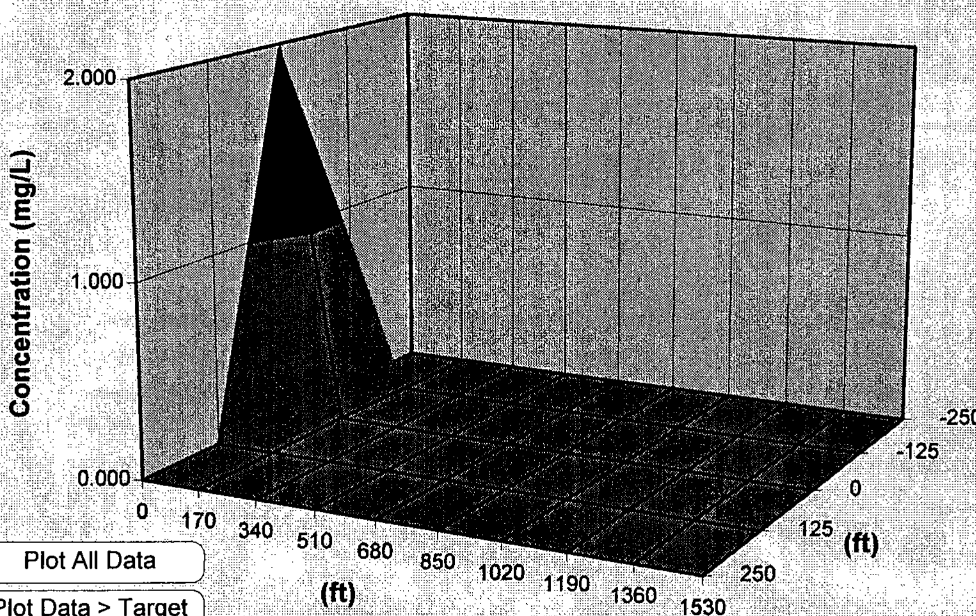
Model to Display:

No Degradation Model

1st Order Decay Model

Instantaneous Reaction Model

Time: **50 Years**   Target Level: **0.700** mg/L   Displayed Model: **1st Order Decay**



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	31.4	*(Kg)*
- Actual Plume Mass	2.1	*(Kg)*
= Plume Mass Removed by Biodeg	**29.3**	*(Kg)* (93 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	*Nitrate*	*Iron II*	*Sulfate*	*Methane*	
na	na	na	na	na	*(Kg)*

Original Mass In Source (Time = 0 Years)	Infinite	*(Kg)*
Mass in Source Now (Time = 50Years)	Infinite	*(Kg)*
Current Volume of Groundwater in Plume	4.9	*(ac-ft)*
Flowrate of Water Through Source Zone	1.055	*(ac-ft/yr)*

Mass HELP

Recalculate

Parris Island, SC
Risk Estimate for Benzene
Scenario: On site worker, volatilization from groundwater, inhalation exposure

	Units	Benzene
Concentration		
Cw, Conc. in water	Conc. mg/l	1.8
H, Henry's constant	L-H2O/L-air	2.20E-01
Calculation: Cair=(Cw*H)		
Cair mg/l		0.396
Cair mg/m3		0.000396
INTAKE		
IR, Inhalation Rate	m3/day	20
CF, Conversion Factor	hrs/day	24
EF, Exposure Frequency	days/yr	250
ET, Exposure Time	hrs/day	8
ED, Exposure Duration	yrs	1
AT, Averaging Time (70 yr*365 days/yr)	days	25550
BW, Body Weight	kg	70
Calculation: Intake= (Cair*IR*EF*ET*ED)/(CF*AT*BW)		
Intake, mg/kg-day		3.69024E-07
RISK		
Slope Factor		2.90E-02
Calculation: Risk=SF*Intake		
Cancer Risk		1.07017E-08

INPUTS

Distance to receptor - X_{ft}	1700.000	feet
Width of impacted groundwater - S_w	4572.000	cm
Depth of impacted groundwater - S_d	609.600	cm

CALCULATIONS

X	51816.000	cm
αx	5181.600	cm
αy	1727.200	cm
αz	259.080	cm

SOLUTION

DAF Saturated zone (without decay)	1.571E+02	unitless

$$DAF=1/((ERF(S_w/(4*((\alpha_y*X)^\wedge(1/2)))))*(ERF(S_d/(4*((\alpha_z*X)^\wedge(1/2))))))$$

Contaminant	Maximum Source Concentration (MSC)	Model Predicted Receptor Point Concentration (MSC/DAF)
Lead	0.258	**0.00164191**

*ASTM code page 31 Table X3.1: Steady State Attenuation Model

Future On-Site Worker Scenario

Reasonable maximum exposure assumptions and human intake factors for dermal contact with ground water by a future industrial worker.

Absorbed dose (mg/kg day)= (C*SA*PC*ET*EF*ED*CF)/(BW*AT)

	Benzene	Ethylbenze	Toluene
C: Concentration (mg/l)	1.84	1.98	2.63
SA: Surface area (arms, legs, hands) (m2)	0.862	0.862	0.862
PC: Permeability Constant (Chemical Specific) (cm/hr)	0.021	0.074	0.074
ET: Exposure Time (hours/day)	2.6	2.6	2.6
EF: Exposure frequency (days/yr)	30	30	30
ED: Exposure Duration (years)	1	1	1
CF: Conversion Factor (l/cm-m2)	10	10	10
BW: Body Weight (kg)	70	70	70
AT: Averaging Time (yr*day/yr)	25550	365	365
Dermal Slope Factor (Chemical Specific)	2.99E-02	N/A	N/A
Dermal Reference Dose (RfD) (Chemical Specific)	N/A	9.70E-02	1.60E+00

Risk and Hazard Index Calculations			
	Benzene	**Ethylbenzene**	**Toluene**
Absorbed Dose (using above calculation)	1.45261E-05	3.86E-03	5.12E-03
Risk = SF * Intake	4.34331E-07	N/A	N/A
Hazard Index (Dose/RfD)	N/A	3.97E-02	3.20E-03

Absorbed Dose Calculation from - RAGS, table 6-13 "Dermal Contact with Chemicals in Water"
GI Absorption data to derive Dermal Slope Factor for Benzene from Sabourin, P.J, B.T. Chen, G. Lucier, et al., 1987
GI Absorption data to derive Reference Dose for Ethylbenzene from Sabourin, P.J, B.T. Chen, G. Lucier, et al., 1987
GI Absorption data to derive Reference Dose for Toluene from ATSDR (Agency for Toxic Substances and Disease Registry), 1989